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## 1.0 PROJECT OBJECTIVES

1.0.1 The project objective is to design and construct facilities for the military that are consistent with the design and construction practices used for civilian sector projects that perform similar functions to the military projects. For example, a Company Operations Facility has the similar function as an office/warehouse in the civilian sector; therefore the design and construction practices for a company operations facility should be consistent with the design and construction of an office/warehouse building.

### Comparison of Military Facilities to Civilian Facilities

Military Facility	Civilian Facility
Tactical Equipment Maintenance Facility (TEMF)	Heavy Equipment/Vehicle Maintenance Garage

1.0.3 1.0.2 It is the Army's objective that these buildings will have a 25-year useful design life before a possible re-use/re-purpose or renovation requirement, to include normal sustainment, restoration, modernization activities and a 50-year building replacement life. Therefore, the design and construction should provide an appropriate level of quality to ensure the continued use of the facility over that time period with the application of reasonable preventive maintenance and repairs that would be industry-acceptable to a major civilian sector project OWNER. The site infrastructure will have at least a 50-year life expectancy with industry-accepted maintenance and repair cycles. The project site should be developed for efficiency and to convey a sense of unity or connectivity with the adjacent buildings and with the Installation as a whole.

1.0.4 Requirements stated in this contract are minimums. Innovative, creative, and life cycle cost effective solutions, which meet or exceed these requirements are encouraged. Further, the OFFEROR is encouraged to seek solutions that will expedite construction (panelization, pre-engineered, etc.) and shorten the schedule. **The intent of the Government is to emphasize the placement of funds into functional/operational requirements. Materials and methods should reflect this by choosing the most economical Type of Construction allowed by code for this occupancy/project allowing the funding to be reflected in the quality of interior/exterior finishes and systems selected.**

## 1.1. SECTION ORGANIZATION

This Section is organized under 6 major "paragraphs".

- (1) Paragraph 1 is intended to define the project objectives and to provide a comparison between the military facility(ies) and comparable "civilian" type buildings.
- (2) Paragraph 2 describes the scope of the project.
- (3) Paragraph 3 provides the functional, operational and facility specific design criteria for the specific facility type(s) included in this contract or task order.
- (4) Paragraph 4 lists applicable industry and government design criteria, generally applicable to all facility types, unless otherwise indicated in the Section. It is not intended to be all-inclusive. Other industry and government standards may also be used, where necessary to produce professional designs, unless they conflict with those listed.
- (5) Paragraph 5 contains Army Standard Design Criteria, generally applicable to all facility types, unless otherwise indicated in the Section.
- (6) Paragraph 6 contains installation and project specific criteria supplementing the other 5 paragraphs.

## 2.0 SCOPE

### 2.1. TACTICAL EQUIPMENT MAINTENANCE FACILITY (TEMF)

Provide Tactical Equipment Maintenance Facilities. This project type is to provide facilities for the purpose of maintaining and repairing vehicles, complete with equipment and parts storage and administrative offices. It is intended to be similar to heavy equipment or motor pool facilities in the private sector community. Assume 12 percent of personnel are female unless otherwise indicated.

The project will include TEMFs for 1 battalion(s). Specific sizing parameters for each battalion TEMF included in the project are as follows:

- 3rd BCT Brigade Support Battalion

- TEMF size: Medium

- A 10-ton bridge crane is required in this TEMF.

- Number of organizational vehicles to be accommodated: 242

- Organizational vehicle hardstand: 36,413 square yards

- Organizational storage building: 35,700 square feet

- POL storage building: 600 square feet

- Hazardous waste storage building: 600 square feet

- Distribution company storage building, 8000 SF w/445 SY Secure Storage, NOT required

- UAV maintenance and storage, 1800SF, IS required

- POL vehicle parking IS required

The maximum gross area for the primary Tactical Equipment Maintenance Facilities (excluding site storage buildings) in the project is limited to 35,290 SF.



## 2.2. SITE:

Provide all site design and construction within the TEMF limits of construction necessary to support the new building facilities. Supporting facilities include, but are not limited to, utilities, electric service, exterior and security lighting, fire protection and alarm systems, security fencing and gates, water, gas, sewer, oil water separators, storm drainage and site improvements. Provide accessibility for individuals with disabilities. Include Antiterrorism/Force Protection measures in the facility design in accordance with applicable criteria.

Maintain the construction site and haul route. Repair/replace damage to existing sidewalks, pavements, curb and gutter, utilities, and/or landscaping within the construction limit, adjacent to the construction site, and along the Contractor's haul route resulting from the Contractor's construction activities at no additional cost to the Government. Prior to construction activities, Contractor and Contracting Officer Representative shall perform an existing condition survey. At completion of the Task Order, Contractor and Contracting Officer representative shall perform a final condition survey to determine repair/replacement requirements.

Approximate area available for this (these) facility(ies) is shown on the drawings.

Provide all site improvements necessary to support the new building facilities. Refer to Paragraph 6.

Approximate area available 32.00 acres

## 2.3. GOVERNMENT-FURNISHED GOVERNMENT-INSTALLED EQUIPMENT (GFGI)

Coordinate with Government on GFGI item requirements and provide suitable structural support, brackets for projectors/VCRs/TVs, all utility connections and space with required clearances for all GFGI items. Fire extinguishers are GF/GI personal property, while fire extinguisher brackets and cabinets are Contractor furnished and installed CF/CI. All Computers and related hardware, copiers, faxes, printers, video projectors, VCRs and TVs are GFGI.

The following are also GFGI items: NONE

## 2.4. FURNITURE REQUIREMENTS

Provide furniture design for all spaces listed in Chapter 3 and including any existing furniture and equipment to be re-used. Coordinate with the user to define requirements for furniture systems, movable furniture, storage systems, equipment, any existing items to be reused, etc. Early coordination of furniture design is required for a complete and usable facility.

The procurement and installation of furniture is NOT included in this contract. Furniture will be provided and installed under a separate furniture vendor/installer contract. The general contractor shall accommodate that effort with allowance for entry of the furniture vendor/installer onto this project site at the appropriate time to permit completion of the furniture installation for a complete and usable facility to coincide with the Beneficial Occupancy Date (BOD) of this project. The furniture vendor/installer contract will include all electrical pre-wiring and the whips for final connection to the building electrical systems however; the general contractor shall make the final connections to the building electrical systems under this contract. Furthermore, the general contractor shall provide all Information/Technology (IT) wiring (i.e. LAN, phone, etc.) up to and including the face plate of all freestanding and/or systems furniture desk tops as applicable, the services to install the cable and face plates in the furniture, the coordination with the furniture vendor/installer to accomplish the installation at the appropriate time, and all the final IT connections to the building systems under this contract.

The Government reserves the right to change the method for procurement of and installation of furniture to Contractor Furnished/Contractor Installed (CF/CI). CF/CI furniture will require competitive open market procurement by the Contractor using the Furniture, Fixtures and Equipment (FF&E) package.

## 2.5. NOT USED

### 3.0 TACTICAL EQUIPMENT MAINTENANCE FACILITY (TEMF)

#### 3.1. GENERAL

- (1) **Functional Areas.** The primary TEMF is composed of two main types of functional areas: Repair Bays (consisting of Repair areas and Maintenance areas), and the Core Area. Refer to the attached Floor Plans for recommended layout.
- (2) **Gross Building Area.** Gross areas of facilities shall be computed according to subparagraphs below. Maximum gross area limits indicated in Paragraph 2.0, SCOPE, may not be exceeded. A smaller overall gross area is permissible if all established net area program requirements are met.
  - (a) **Enclosed Spaces.** The gross area includes the total area of all floors, including basements, mezzanines, penthouses, usable attic or sloping spaces used to accommodate mechanical equipment or for storage with an average height of 6'-11" measured from the underside of the structural system and with the perimeter walls measuring a minimum of 4'-11" in height, and other enclosed spaces as determined by the effective outside dimensions of the building.
  - (b) **One-Half Spaces.** One half of the area will be included in the gross area for balconies and porches; exterior covered loading platforms or facilities, either depressed, ground level, or raised; covered but not enclosed passageways or walks; covered and uncovered but open stairs; and covered ramps.
  - (c) **Excluded Spaces.** Crawl spaces; exterior uncovered loading platforms or facilities, either depressed, ground level, or raised; exterior insulation applied to existing buildings; open courtyards; open paved terraces; roof overhangs and soffits for weather protection; uncovered ramps; uncovered stoops; and utility tunnels and raceways will be excluded from the gross area.
- (3) **Net Area.** Net area requirements for functional spaces are included in the drawings. If net area requirements are not indicated, the space shall be sized to accommodate the required function, comply with code requirements, comply with overall gross area limitations and other requirements of the RFP (for example, area requirements for corridors, stairs, and mechanical rooms will typically be left to the discretion of the Offeror).
- (4) **Deviations and Improvements.** It is the intent of this document to allow deviations and improvements to the design shown.
- (5) **Handicapped Access.** All TEMF buildings are to be handicapped accessible.
- (6) **Site Design and Functional Areas.** Site features include vehicular hardstand, utilities and site improvements.

##### 3.1.1. Repair Areas and Vehicle Corridor/Maintenance Areas

Repair areas and maintenance areas are garage areas used for service and repair of the full range of Army tactical equipment. They are single story ground floor spaces. A typical structural bay to accommodate both repair and maintenance areas is sized to measure 32' x 96'. Conceptually, this structural bay contains four 16' x 32' repair work areas, and a 32' wide vehicle corridor dividing them crosswise. The vehicle corridor also serves as a maintenance area. It accommodates 16' x 32' maintenance work areas down the length of the entire building. Two contiguous work areas may be required to accommodate work on larger equipment, thus resulting in the need for work areas to be constructed in pairs. Repair and maintenance areas are to be free of intermediate support columns, i.e. columns are only permissible along exterior perimeter walls. This allows complete shop floor coverage by a single bridge crane for all contiguous maintenance and repair areas (each wing of the facility). TEMFs requiring four structural bays or less shall be constructed contiguously in a single wing of the facility.

- (1) **Repair Areas**
  - (a) **Function.** Repair of vehicles as described above. Structural height shall be as required to allow minimum bridge crane hook cradle height of 20 feet (minimum of 25 feet for bays with 35-ton bridge cranes). Overhead coiling doors, 24'-0" wide x 14'-0" high, shall be provided at each end of each structural bay.
  - (b) **Equipment.** Repair Bays shall be served by a 10-ton or a 35-ton capacity traveling bridge crane with full structural bay coverage as indicated in the Architectural TEMF Features Matrix and as specified in Para. 2.1. Additional requirements are specified in the paragraph ARCHITECTURE.
  - (c) **Provide one hose bibb and two compressed air outlets 3'-0" above the floor for each pair of repair areas.**

(d) Welding/Machine Shop Area: Provide special purpose repair space to support machine shop equipment and power connectivity for portable welding equipment within one pair of repair areas, typically in repair bay farthest from the Core Area. This area will not be used exclusively for welding. It may be utilized as a repair area also and shall be equipped with all requirements for repair areas except items (e), and (j).

(e) Provide utilities for component washing and vehicle spot washing in the outermost work area of each wing of repair/maintenance areas. Provide a 5'-4" high concrete masonry wall separating the outermost bay from others to contain spray resulting from engine and component wash functions. Terminate partition to provide 6'-0" clear space at each end of the partition.

(f) In each pair of repair areas, provide electric power for user provided (GFGI) portable hydraulic lift.

(g) Provide continuous 6-inch wide trench drains with continuous grating along full width of bays at exterior doors; locate drains approximately 3'-0" inside face of exterior walls. In addition to the outside trench drains, a center trench drain running the full width of the bays is permissible to facilitate internal drainage of the facility. When a dedicated, partitioned welding area is provided, provide a solid cover to trench drain where it runs through the welding area.

(h) Each work area shall have access to NIPRNet -data connection points.

(i) Provide an outlet to a vehicle exhaust evacuation system for each repair area.

(j) Tire Changing Area: Provide capability for tire changing function where shown on the TEMF Standard Drawings. Tire changing equipment shall be GFGI."

(k) POL Dispensing Points: Provide POL dispensing points between each pair of structural bays so that each repair area has ready access to POL fluids. Two points will be provided in the repair area of a small facility, four in a medium, etc. Hose and reel assembly shall be heavy duty, designed for the applicable fluid or oil. Provide shutoff valve at reel. Provide distribution for grease, engine oil, gear oil, transmission fluid, and antifreeze from each dispensing point.

## (2) Vehicle Corridor/Maintenance Areas

(a) Function. Maintenance of vehicles as described above. Maintenance areas within core area shall be equipped for inspection, oil changing and lubrication. All requirements listed above, except items (d), (e), (f), (j), and (k) apply to the maintenance areas.

(b) Maintenance Area within the High Bay Portion of Facility. Access to compressed air, water, vehicle exhaust, power and data in the maintenance areas within high bay portion of facility shall be via connections along the nearest wall.

(c) Maintenance Area within the Core Area. Maintenance areas within the core area shall be equipped for inspection, oil changing and lubrication. The minimum clear ceiling height shall be 14'-0" Above Finished Floor. Provide an outlet to a vehicle exhaust evacuation system for each pair of maintenance areas. Bridge crane access is not required for maintenance areas along central vehicle corridor in the core area.

1. Maintenance Pit. Provide one 40-foot long x 3'-6" wide concrete maintenance pit in the central vehicle corridor portion maintenance area within the core with stair access. Due to inside clearance for some vehicles, the maximum 3'-6" width is critical for the pit and curbing. Pit shall have non-sparking, non-slip removable floor grating approximately 4'-4" below finish floor elevation, with concrete pit floor below sloping to sump. Provide sump pump, see Paragraph 3.1.8(4) Plumbing for additional information. Provide compressed air outlet at two places in the pit. When not in use, pit shall be provided with removable cover capable of supporting pedestrian traffic. Provide minimum 4-inch high steel angle curb surrounding pit opening. Pit cover panels to be light enough to be handled by a maximum of two personnel.

2. POL Hose Reels. Provide two POL dispensing points mounted to the wall adjacent to maintenance area pit. They should be spaced along the length of the pit. Hose and reel assembly shall be heavy duty, designed for the applicable fluid or oil. Provide shutoff valve at reel. Provide distribution for grease, engine oil, gear oil, transmission fluid, and antifreeze at the two dispensing points on the wall. Provide a third dispensing point mounted in a recess in the maintenance pit. Provide only grease, gear oil and transmission fluid at the dispensing point inside the maintenance pit.

3. Fluid Recovery System: Provide a Pneumatic Fluid Recovery System that will allow the evacuation of used POL fluids and waste antifreeze to the appropriate 500 gallon wasted fluid tank. Provide two collection points for each type of waste fluid within the maintenance pit, and provide a third collection point at a central location within the facility (out of the flow of traffic) to accommodate used fluids collected in the repair area.

(3) Circulation Bays

(a) Provide an 8' wide x 96' long structural bay between each wing of repair bays and the core area to facilitate pedestrian egress from the building and shall conform to OSHA requirements.

(b) Equipment. Provide 4'-0" high x 8'-0" wide framed tack board (for 'safety board') mounted on wall along the circulation bay near the tool room. Provide one permanently installed emergency eyewash, hand held drench hose and shower station at each circulation bay that is adjacent to a core area and provide additional emergency eye wash, hand held drench hose and shower stations in other bays as required per OSHA standard 1910.151(c) and ANSI Z358.1. Provide one or more emergency eyewash, hand held drench hose and shower stations in Consolidated Bench Repair and in the Fluid Distribution Room when the equipment being serviced or solvents being used generate this requirement. Locate emergency wash stations in accordance with OSHA standard 1910.151(c) and ANSI Z358.1. Per OSHA 1910.151(c) emergency eyewash/shower units should be located such that a worker can reach one in 10 seconds. ANSI Z358.1 gives a guideline of 55 feet to meet this requirement.

3.1.2. Core Areas:

Core areas are arranged in one and two story configurations (refer to the attached floor plans for standard layouts). Internal walls within the core should be non-load bearing to the extent possible to allow future rearrangement of spaces.

(1) Administration and Shop Control. Office space to accommodate foremen, production control, and clerical personnel. Provide one space per core; may be located on first or second floor but shall be accessible to the physically disabled. Provide counter and pass-through window between this room and the customer Waiting Area; size pass-through window to accommodate transfer of 30-inch by 30-inch items, and layout the area outside window so that two people can stand at the window and be out of the corridor traffic pattern. Provide viewing windows from administration and shop control space into the repair areas.

(2) Training Room. The training room space is intended to facilitate the training mission for maintenance personnel. This space is to be divided into two training areas with an operable folding partition (movable wall) having a sound isolation of STC 45, minimum. Provision shall be made to accommodate up to 30 students for computer based training, including power and data connections for each student. Provide projection equipment hookups and a screen in the Training Room. In subdivided Training Rooms, two hookups and two pull-down screens are to be provided.

(3) Consolidated Bench. Shop space for unit-level maintenance of electronics, optics, and other gear. Locate on first floor.

(a) Equipment. Provide an overhead coiling door 10'-0" wide x 10'-0" high.

(b) Furnishings/Fixtures. See Table 7 for furnishings. Provide capabilities shown in the features matrix for each work space.

(c) Provide operable exterior windows. Provide at least one window with clear view and unobstructed line of sight out of the building to a minimum of 800 feet for testing weapon sights.

(4) Tool Room. Designated space for the issue and secure storage of unit common tool kits, as well as supplemental tool kits and individual tools shared by shop personnel. Direct covered access from the tool room to the SATS containers (described below) on the exterior of the building is required. Provide lockable pair of personnel doors and pass-through opening with impact resistant counter and metal overhead lockable coiling shutter between Tool Room and Corridor.

(a) Standard Automotive Tool Set (SATS). The SATS is a unit-owned (i.e. GF/GI) containerized tool system with the dimensions of 8' x 20' x 8' high. An exterior hardstand storage area adjacent to the Tool Room shall be provided for three SATS containers. Connectivity to building and installation network is required. SATS are accessed from the end. Provide wall mounted awning with minimum 14-foot clear height above hardstand for weather protected entry into SATS containers. The technical manual for SATS is TM 9-4910-783-13&P.

(5) Tool Box Storage. Provide one Tool Box Storage Room for each wing of Repair Areas (if Repair Areas are located on both sides of a core, each side of core shall have a Tool Box Storage Room). Tool Box Storage is provided for personnel working inside the maintenance complex in the Repair Areas and the Consolidated Bench for the storage of individually assigned or personal (Contractor) tools requiring security. Provide lockable personnel door with closer between Tool Box Storage and Circulation Bay.

(6) Combat Spares. Storage and issue of Prescribed Load List (PLL) and shop stock items kept in stock at all times because of demand or management decisions. Direct covered access from the Combat Spares room to the ASL-MS containers (described below) on the exterior of the building is required. Provide lockable pair of personnel doors so to accommodate 48" x 48" x 74" ASL-MS repair parts bins and shelving modules, and pass-through opening with impact resistant counter and overhead lockable coiling shutter between Combat Spares and Corridor.

(a) Authorized Stockage List - Mobility System (ASL-MS). Similar to the SATS, the ASL-MS is a unit-owned (i.e. GF/GI) 8' x 20' x 8' high container for repair parts. An exterior hardstand storage area adjacent to the Combat Spares room shall be provided for three ASL-MS containers. ASL-MS are accessed from the side. Provide sufficient aisles between ASL-MS for access. Provide wall mounted awning with minimum 14-foot clear height above hardstand for weather protected entry into ASL-MS containers. Provide lockable pair of personnel doors at building exterior to accommodate large bulk portable tools and equipment, and ASLMS repair parts modules. The technical manual for ASL-MS is TM 9-5411-236-13&P.

(7) Latrine, Shower and Locker Rooms

(a) Latrines. Provide separate latrines for men and women on each floor. Provide water closets, urinals, lavatories and drinking fountains in accordance with established layouts and referenced codes.

(b) Shower and Locker Rooms. Provide a Men's Shower and Locker Room and Women's Shower and Locker Room. Locate on first floor of each core, sized to accommodate the number of lockers and showers indicated. Shower and locker area shall be adjacent to and connect to the latrine area. Provide individual shower compartments (3'-0" x 3'-0") in the number indicated on the drawings. Provide a single tier steel locker for each non-administrational occupant of the building, minimum size 1'-0" wide x 1'-6" deep x 6'-0" high.

(8) Break, Training, and Conference (BTC). Locate this room on same floor as Admin and Shop Control.

(a) Furnishings. Provide kitchen, base and wall cabinets and 30-inch deep countertop minimum 10'-0" long.

(b) Equipment. Provide stainless steel two-compartment sink.

(c) Allow space and hookups for vending machines, refrigerator and microwave.

(d) Projection equipment hookups and a pull-down screen are to be provided in Medium, Large and X-Large BTC Room only. Due to small size of BTC Room in the Small TEMF, no projection equipment hookup or screen will be provided in this area.

(9) Vaults. All vault walls, floors and ceilings shall be constructed in compliance with appropriate requirements referenced below. Provision for a user provided (GFGI) intrusion detection system including motion detectors, door alarm, and camera, is required.

(a) Weapons Storage Vault. Provide secure storage of weapons being repaired, especially vehicle-mounted weapons such as machine guns and firing port weapons. Weapons vault walls, floors and ceilings shall be constructed in compliance with AR 190-11, Physical Security of Arms, Ammunition, and Explosives. An option exists for use of prefabricated, modular vaults conforming to Fed. Spec. AA-V-2737 requirements. Provide a GSA-approved Class 5 Armory vault door with lock in accordance with Fed. Spec. AA-D-600D and a "Dutch door" style day gate. Provide an internal wire mesh partitioned space or provide space for GFGI lockable cabinets IAW installation requirements to accommodate armorer's tool kits, spare arms parts, machine gun barrels and major subassemblies. Coordinate arms rack anchor rings, common storage racks, etc with user.

(b) COMSEC Vault. Provide secure storage of communications/cryptology equipment. Room must have a minimum 8-foot dimension. Refer to Physical Security Standards of Appendix D of AR 380-40, Policy for Safeguarding and Controlling Communications Security (COMSEC) Material (FOUO).

(10) Nonsensitive Secure Storage. Nonsensitive Secure Storage shall be constructed to meet Secure Storage standards for Risk Level II per AR 190-51, Security of Unclassified Army Property.

(11) Telecommunications- Room-. Telecommunications rooms shall be provided for voice and data. There shall be a minimum of one room on each floor, located as near the center of the building as practicable, and stacked between floors. The telecommunications rooms shall be designed in accordance with the Technical Criteria for Installation Information Infrastructure Architecture I3A Criteria and ANSI/EIA/TIA-569-B. SIPRNET Room shall also be provided for future SIPRNet connectivity in accordance with the Technical Guide for the Integration of Secret Internet Protocol Router Network (SIPRNet). Due to NEC security requirements, Mass Notification, Fire Alarm and CATV panels cannot be located in the Telecommunications Room, these panels will be located in the Electrical room. Where required, the Fire Alarm Panel may be located in the Mechanical Room.

(12) Non-Assignable Spaces and Gross Area. The items below account for additional gross area within the core that is not specifically listed in the spaces above. These items may also vary in size contingent on site, climate, type and use.

- (a) Stairwells. Design in accordance with model and local building codes.
- (b) Elevator. Provide one passenger elevator in each two-story building. Elevator machine room is also part of the gross area of the core.
- (c) Common Circulation Corridors. All circulation corridors shall be a minimum of 6 feet wide.
- (d) Waiting Area. Locate adjacent to Admin and Shop Control pass-through window off of corridor. Size Waiting Area for the seating of a minimum of four persons.
- (e) Janitorial Spaces. Provide one janitorial space as shown on drawings with mop sink and heavy duty shelving. Expansion of the Janitorial Space to include a recycling function is optional.
- (f) Mechanical Rooms. Utility space must be provided for heating and cooling equipment. Where feasible, vertically stack like utility spaces if located on two floors. Locate first floor mechanical rooms adjacent to exterior walls for external maintenance access and ventilation. See paragraph 3.1.7 Heating, Ventilation, and Air Conditioning (HVAC) Systems, for additional requirement. Walls and floor/ceiling assemblies enclosing mechanical room shall have a sound transmission class (STC) rating of not less than 50 (45 if field tested) for air-borne noise when tested in accordance with ASTM E 90, and an impact insulation class (IIC) rating of 50 (45 if field tested) when tested in accordance with ASTM E 492.
- (g) Electrical Rooms. Locate first floor electrical rooms adjacent to exterior walls for external maintenance access and ventilation.
- (h) Fluid Distribution Room. Provide a room to house the POL central distribution equipment and unused POL storage containers (typically 55-gallon drums) for five types of lubricants/fluids. Fluids shall be dispensed by automotive lubricant type air driven pump assemblies. Motor shall be heavy-duty compressed air driven reciprocating action. For antifreeze unit all parts shall be corrosion resistant. Locate near maintenance pit to minimize length of fluid distribution lines. Compliance with UFC 3-600-01, NFPA 30, and 29 CFR 1910.106 is mandatory. Provide secondary containment in compliance with applicable federal and state environmental regulations. Square footage for this space is part of the gross area for the core.

### 3.1.3. Site Functional Area

- (1) Dock. Provide one docking location for maintenance and electronic testing of specialized, permanently vehicle mounted, communications equipment. Provide equipment power connections and grounding points for vehicle degauss and individual personnel static discharge protection of equipment.
- (2) Organizational Vehicle Hardstand. This area consists of a rigid concrete paved area used for parking assigned vehicles (wheeled and heavy and tracked), commercial vehicles (Contractor support), trailers and generators. Organizational vehicle hardstand includes building aprons, parking spaces, and circulation lanes on site.
  - (a) Tactical/Military and Commercial Vehicle Parking. Maximize vehicle parking and traffic flow to best support the operation of the TEMF.
  - (b) POL Vehicle Parking Area. Parking for POL vehicles is considered separate from other organizational vehicle parking and shall be segregated from other vehicle parking areas.
  - (c) Dead Line Vehicle Parking. Parking for vehicles waiting for parts or for work to be performed. One dead line parking space for every pair of repair areas and shall be located in parking areas adjacent to repair bays that will service them.
  - (d) Building Aprons. Provide concrete pavement for aprons associated with each of the facilities located in the maintenance complex.
- (3) Site Storage
  - (a) Hazardous Waste Storage Building. Provide a building with solid walls and roof. It is used to temporarily store used lubricants, flammable solvents, dry sweep, etc. A unit is authorized 60 square feet for each 25 vehicles, or part thereof, which it maintains. A minimum of 120 square feet of hazardous waste storage space will be provided. The specific requirement for this project is specified in Para. 2.1. Provide secondary containment in compliance with applicable federal and state environmental regulations. Compliance with UFC 3-600-01, NFPA

30, and 29 CFR 1910.106 is mandatory. Maintain minimum separation distance from other buildings in accordance with the IBC in order to eliminate the need for automatic sprinkler protection. Pre-fabricated, fire-rated, self-contained, moveable steel safety storage buildings are permitted as an option. Minimum size of 120 SF per container, though multiple containers may add up to the total quantity required per satellite accumulation area. Hazardous Waste Storage Buildings do not require sprinkler protection if the following conditions are met:

1. The buildings shall not exceed 1000 SF in area. For facilities over 1000 SF, in order to reduce costs, divide the total requirement for these facilities into multiple buildings so that each building is less than 1000 SF.
2. The buildings shall be separated from tactical equipment maintenance facilities or other important buildings by a minimum of 60 feet.
3. Construction and exterior separation of Hazardous Waste Storage Buildings shall be per UFC 3-600-01 and NFPA 30 as indicated with the following restrictions. Where multiple POL and Hazardous Waste Storage buildings are present, groups of POL and Hazardous Waste Storage Buildings shall not exceed two buildings and shall be separated by no less than 10 feet. Additional POL and Hazardous Waste Storage Buildings or groups of two buildings shall be separated by not less than 50 feet from adjacent POL and Hazardous Waste Storage Buildings.

(b) POL Storage Building. Provide a building for the storage of oil, lubricants, and flammable solvents for daily use. A unit is authorized 60 square feet for each 25 vehicles, or part thereof, which it maintains. A minimum of 120 square feet of oil storage space will be provided. The specific requirement for this project is specified in Para. 2.1. Provide an access apron at the entry of this building. Provide secondary containment in compliance with applicable federal and state environmental regulations. Compliance with UFC 3-600-01, NFPA 30, and 29 CFR 1910.106 is mandatory. Maintain minimum separation distance from other buildings in accordance with the IBC and local codes in order to eliminate the need for automatic sprinkler protection. Pre-fabricated, fire-rated, self-contained, moveable steel safety storage buildings are permitted as an option. Minimum size of 120 SF per container, though multiple containers may add up to the total quantity required per satellite accumulation area. POL Storage Buildings do not require sprinkler protection if the following conditions are met:

1. The buildings shall not exceed 1000 SF in area. For facilities over 1000 SF, in order to reduce costs, divide the total requirement for these facilities into multiple buildings so that each building is less than 1000 SF.
2. The buildings shall be separated from tactical equipment maintenance facilities or other important buildings by a minimum of 60 feet.
3. Construction and exterior separation of Hazardous Waste Storage Buildings shall be per UFC 3-600-01 and NFPA 30 as indicated with the following restrictions. Where multiple POL and Hazardous Waste Storage buildings are present, groups of POL and Hazardous Waste Storage Buildings shall not exceed two buildings and shall be separated by no less than 10 feet. Additional POL and Hazardous Waste Storage Buildings or groups of two buildings shall be separated by not less than 50 feet from adjacent POL and Hazardous Waste Storage Buildings.

(c) Organizational Storage Building. This building is for storage of deployment equipment. The size of this facility is determined by the organizational structure and the number of organizational vehicles; specific to each project. Provide a 10' x 10' coiling door and a personnel door for each 700 SF of company supply area along one side of building. Provide internal wire or secure partitions between each 700 SF space. Floor area of building shall be as specified in the project scope of work. Building shall be approximately 25 feet deep. The floor system of this facility should be designed for fork-lift lifting.

(d) Distribution Company Storage Facility. Not required

(e) Secure Open Storage. Where a Distribution Company Storage Facility is provided, provide a 445 SY fenced area on concrete paving for exterior storage.

(f) UAV Storage Building. This building is for storage of Unmanned Aerial Vehicles (UAV). Provide a 40-foot by 45-foot (1800 SF) building to accommodate Storage of assigned UAVs. Provide a 24' x 14' coiling door as well as minimum two personnel doors for emergency egress and ingress.

(g) Used Oil Storage Tank(s). Provide one 500-gallon above-ground used engine oil storage tank at the end of the Repair Areas. Tank shall be constructed of non-corrosive material. Provide secondary containment in compliance with applicable federal and state environmental regulations. Tank construction and location shall comply with IBC requirements. Recommended location is adjacent to the end repair area. Used oil, waste fuel, and used engine coolant storage tanks should be co-located, if possible.

- (h) Used Engine Coolant (antifreeze) Storage Tank(s). Provide one 500-gallon above-ground used engine coolant storage tank at the end of the Repair Areas. Tank shall be constructed of non-corrosive material. Provide secondary containment in compliance with applicable federal and state environmental regulations. Tank construction and location shall comply with IBC requirements. Recommended location is adjacent to the end repair areas. Used oil, waste fuel, and used engine coolant storage tanks should be co-located, if possible.
- (i) Out of Spec Waste Fuel Tank(s). Provide one 500-gallon above-ground Out-of-Spec Waste Fuel Tank at the end of Repair Areas. Tank shall be constructed of non-corrosive material. Provide secondary containment in compliance with applicable federal and state environmental regulations. Tank construction and location shall comply with IBC requirements. Recommended location is adjacent to the end repair area. Used oil, waste fuel, and used engine coolant storage tanks should be co-located, if possible.
- (4) Entrance Drives. Provide primary and secondary entrance drives to connect organizational vehicle hardstand to existing roads and/or tank trails.
- (5) Privately Owned Vehicle (POV) Parking. Provide POV parking at the rate of 56% of the total assigned personnel.

3.1.4. Site Design The following drawing should be used to associate relative adjacencies for site structures.

- (1) Hardstand. All hardstand areas shall be rigid concrete pavement. Pavement design for organizational vehicle areas shall be designed to support the vehicles assigned to this facility and the heaviest vehicle at the installation. See appendix for Organizational Vehicle assigned to this facility. The parking layout and configuration shall be adjusted as necessary to for the site limits and space provided.
- (2) Antiterrorism and Force Protection. Each project should be evaluated for security requirements in accordance with UFC 4-010-01. Minimum requirement is a security fence at the site perimeter consisting of 7-foot high chain link fabric plus a single outrigger with 3-strand barbed wire, designed in accordance with STD 872-90-03, FE-6, Chain-Link Security Fence Details. A zone cleared of trees and shrubs, 20 feet wide inside the fence and 10 feet wide outside the fence is required. The clear zone shall be gravel underlain by a synthetic fabric. The clear zone shall be treated with herbicides to discourage vegetative growth. Manually operated vehicular gates, approximately 30 feet wide overall, shall be provided at each vehicle entrance/exit.
- (3) Storm Water Management. Site storm water management may require controls on the peak flow that can be discharged. Installations are required to have a storm water pollution prevention plan. Implement the applicable portions of this plan using best management practices. Segregate drainage from areas likely to be contaminated (e.g., fueling area). Provide treatment for contaminated water prior to its discharge. Maintenance should not be performed outside the primary facility.
- (4) Storm Drainage System. Construction and material specified for storm drainage installation shall be per the State's DOT requirements. All storm drainage lines constructed under organizational vehicle hardstand, entrance drives, and other surfaces subject to vehicular traffic shall be reinforced concrete pipe with watertight joints. See paragraph 6 for additional storm drainage system requirements.
- (5) Oil/Water Separator. One or more oil/water separators are required to remove, oil, lubricants, floatables, and grit from contaminated water sources (e.g., repair and maintenance areas, POL fluids distribution, etc.). Oil/water separators shall be designed in accordance with local codes and standard industry practice for the specific waste stream to be treated. Minimize maintenance requirements and locate oil/water separators to minimize pipe runs, provide vehicular access, and built out of circulation areas.
- (6) Used and Waste Oil, Antifreeze, Solvents, Cleaning Compounds, and Hazardous Materials Hazardous materials generated in the course of maintenance operations shall be classified in accordance with 40 CFR 261. Criteria for short term storage (less than 90 days) of hazardous materials is provided in 40 CFR 262. Long-term storage is not authorized for TEMF facilities. The installation Defense Resources Management Office has responsibility for long term storage. Long term storage of hazardous materials is governed by 40 CFR 264.
- (7) Primary and Secondary drives. Provide a primary and secondary entrance drive into the organizational vehicle hardstand area. The primary and secondary entrance drives shall be 30 feet wide.
- (8) Organizational Vehicle hardstand. Organizational vehicle pavement grades shall provide positive surface drainage with a 1 percent minimum slope in the direction of drainage. Maximum pavement slope shall be 2 percent.
- (9) Circulation Lane. Organizational vehicle parking circulation lanes shall be 20 feet wide when lanes are located adjacent to TEMF aprons. Parking stalls within the hardstand are to be placed back-to-back with circulation lane widths of 30 feet for vehicles less than or equal to 18 feet long and 45 feet for vehicles more than 18 feet long.



- (10) Tactical/Military Vehicle Parking. Tactical/Military Vehicle Parking spaces shall be spaced with side clearances of 3 feet and end clearances of 2 feet.
- (11) POL Vehicle Parking (if applicable). POL vehicle parking shall be physically separated from organizational hardstand. POL parking shall be spaced a minimum of 10 feet between vehicles. POL parking area circulation lanes shall be 50 feet wide. Drainage from the POL parking area shall be isolated and shall not be allowed to enter underground storm or sanitary sewer systems without being impounded first and manually released. POL drainage impoundment shall be located 100 feet from any structure.
- (12) Dead Line Vehicle Parking. Dead Line Vehicle Parking spaces shall be sized based on the largest vehicle for the assigned maintenance bay. Parking spaces shall be spaced with side clearances of 3 feet and end clearances of 2 feet.
- (13) TEMF Aprons. TEMF aprons shall measure 45 feet wide on all four sides of the facility. Circulation lanes are not part of the 45-foot wide apron.
- (14) Site Storage Building Aprons. Site storage building aprons shall measure 27 feet wide along the entire building length on the vehicular access side. Circulation lanes are not part of the 27-foot wide apron.
- (15) Bollards at TEMF repair bays. Provide 12-inch diameter steel bollards filled with concrete at all TEMF repair bay openings where frequent vehicle access/egress increases the risk of damage by vehicle impact. Bollard footings shall be designed to withstand organizational vehicular impact.
- (16) Mechanical and Electrical Equipment Yard. Provide 12-inch diameter by 5-foot high, concrete-filled, schedule 80 galvanized steel pipe bollards, 5 feet O.C. spacing, 5 feet from edge of the mechanical and Electrical Equipment Yard, painted safety yellow, around the perimeter of the equipment yards. Provide vehicular access and locate out of circulation areas. Bollard footings shall be designed to withstand organizational vehicular impact.
- (17) Bollards at Out of Spec Waste Fuel, Used Oil and Used Engine Coolant (antifreeze) Storage Tank(s). Provide 12-inch diameter by 5-foot high, concrete-filled, schedule 80 galvanized steel pipe bollards, 5 feet O.C. spacing, 5 feet from edge of containment wall, painted safety yellow, around the perimeter of above-ground tank areas. Bollard footings shall be designed to withstand organizational vehicular impact.
- (18) Bollards at Site Storage Buildings. Provide 12-inch diameter by 5-foot high, concrete-filled, schedule 80 galvanized steel pipe bollards, 5 feet O.C. spacing, 5 feet from the edge of the building. Bollard spacing may be greater than 5' O.C. if portion of building being protected is not in a high volume traffic area. Bollard footings shall be designed to withstand organizational vehicular impact.

### 3.1.5. Architecture

- (1) Exterior Materials. Select exterior materials to be attractive, economical, and durable and low maintenance. Masonry walls are recommended at the ground floor level.
- (2) Floors. Provide concrete floors in maintenance and repair areas sloped in accordance with NFPA 30A and IBC/IPC. Provide a continuous trench drain located on the interior side of the overhead doors at repair areas and at centerline of central vehicle corridor, extending the length of maintenance areas.
- (3) Natural Lighting. Repair and maintenance bays, storage and admin areas shall be illuminated using hybrid lighting systems which includes electric lighting with electronic daylight controls in combination with skylights with reflective tube that channels the light into the work area and a lens that diffuses the light, clerestory windows, and translucent wall panels above overhead doors. Open maintenance and storage sheds shall use hybrid lighting systems with a dome-shape skylights. Provide operable windows for natural lighting and ventilation in administration and shop control, training room, break/training/conference room, and consolidated bench repair shop. Preference will be given for designs providing vision panels in overhead doors.
- (4) Partitions. Fixed walls are required to separate repair areas and maintenance areas from the core areas, along corridors, and surrounding fixed areas such as latrines, vaults, storage areas and shops. Shops and storage areas may be subdivided with metal mesh partitions. Admin., training and break room walls should be non-load bearing to the greatest extent possible (for example, gypsum board on steel studs) except around latrines.
- (5) Sound Insulation. Provide sound insulation in all administration areas, training rooms, and bench repair areas to meet a minimum rating of STC 42 at walls and floor/ceiling assemblies, and a rating of STC 33 for doors. In addition to the sound insulation required, training areas shall meet a Noise Criteria (NC) 30 rating in accordance with ASHRAE Fundamentals Handbook.

(6) Repair Area Bay Doors. Provide overhead doors 24 feet wide by 14'-0" feet high in the exterior wall at each end of each structural bay. Provide doors of coiling, sectional, or telescoping design. Provide electrically operated doors with provision for manual chain operation. Provide manual 10-foot by 10-foot overhead doors for Consolidated Bench Repair Shop.

(a) Locking. Provide overhead doors that are operable from the interior only. Provide doors with a positive locking mechanism that will allow the door to remain open at engine exhaust position approximately 1 foot above the floor. Coordinate door locking requirements with the using service.

(b) Serviceability. Repair and maintenance bay doors shall be designed to meet heavy duty loads and high frequency of operation. Provide testing of deflection and operation of the doors prior to acceptance during construction. Doors shall be provided and installed by a commercial door company having not less than 5 years of experience in manufacturing, installing, and servicing the size and type of doors provided.

(c) Insulated Doors. Preference will be given to proposals that include insulated doors for thermal resistance and noise control.

(7) Personnel Doors. Provide exterior personnel doors in the ends of central vehicle corridor portion of maintenance areas and in the circulation bays as shown on the drawings. Provide steel doors with vision panels, except at storage, janitorial, and latrine areas. Minimum size for personnel doors is 3 feet wide by 7 feet high.

(8) Overhead Cranes. Crane shall be designed and constructed to CMAA 70 (Class C) or CMAA 74 (moderate requirements) for operation with hoist in accordance with ASME HST-1 or HST-4.

(a) The 10-ton crane shall have the following rated load speeds (plus or minus 15 percent):

1. Hoist - 20 fpm
2. Trolley - 65 fpm
3. Bridge - 125 fpm

(b) The 35-ton crane shall have the following rated load speeds (plus or minus 15 percent):

1. Hoist - 10 fpm
2. Trolley - 60 fpm
3. Bridge - 85 fpm

(c) Hoist motor control system shall provide one speed in each direction.

(d) Bridge and trolley main control systems shall provide one speed in each direction.

(e) Provide runway stops at limits of crane bridge travel.

### 3.1.6. Fire Protection

#### 3.1.6.1. Standards and Codes

All fire protection and life safety features shall be in accordance with UFC 3-600-01 and the criteria referenced therein. Tactical Equipment Maintenance Facilities shall be classified as mission essential and shall be provided with complete sprinkler protection.

#### 3.1.6.2. Fire Protection and Life Safety Analysis

A fire protection and life safety design analysis shall be provided for all buildings in the project. The analysis shall be submitted with the interim design submittal. The analysis shall include classification of occupancy (both per the IBC and NFPA 101); type of construction; height and area limitations (include calculations for allowable area increases); life safety provisions (exit travel distances, common path distances, dead end distances, exit unit width required and provided); building separation or exposure protection; specific compliance with NFPA codes and the IBC; requirements for fire-rated walls, doors, fire dampers, etc.; analysis of automatic suppression systems and protected areas; water supplies; smoke control systems; fire alarm system, including connection to the base-wide system; fire detection system; standpipe systems; fire extinguishers; interior finish ratings; and other pertinent fire protection data. The submittal shall include a life safety floor plan for all buildings in the project showing occupant loading, occupancy classifications and construction type, egress travel distances, exit capacities, areas with sprinkler protection, fire extinguisher locations, ratings of fire-resistive assemblies, and other data necessary to exhibit compliance with life safety code requirements.

### 3.1.6.3. Sprinkler System

Provide complete sprinkler protection for Vehicle Maintenance, UAV Storage Buildings, Organizational Storage Buildings, and Distribution Company Storage Buildings. Wet pipe sprinkler systems shall be provided in areas that are heated and dry pipe sprinkler systems shall be provided in areas subject to freezing. All floors and all areas of the facilities shall be protected. The sprinkler system design shall be in accordance with UFC 3-600-01 and NFPA 13. The sprinkler hazard classifications shall be in accordance with UFC 3-600-01, NFPA 13, and other applicable criteria. Design densities, design areas and exterior hose streams shall be in accordance with UFC 3-600-01. Fire suppression for UAV aircraft bays shall be wet pipe sprinkler systems. UAV bay design density shall be 0.40 gpm/sf, design area shall be the entire UAV bay, and exterior hose stream shall be 500 gpm. Sprinklers in UAV bays shall be 286 degree F quick response type. The sprinkler systems shall be designed and all piping sized with computer generated hydraulic calculations. The exterior hose stream demand shall be included in the hydraulic calculations. A complete sprinkler system design, including sprinklers, branch lines, floor mains and risers, shall be shown on the drawings. The sprinkler system plans shall include node and pipe identification used in the hydraulic calculations. All sprinkler system drains, including main drains, test drains, and auxiliary drains, shall be routed to a 2' x 2' splash block at exterior grade.

### 3.1.6.4. Sprinkler Service Main and Riser

The sprinkler service main shall be a dedicated line from the distribution main. Sprinkler service and domestic service shall not be combined. The sprinkler service main shall be provided with an exterior post indicator valve with tamper switch reporting to the fire alarm control panel (FACP). The ground floor entry penetration shall be sleeved per NFPA 13 requirements for seismic protection. The sprinkler entry riser shall include a double check backflow preventer, a fire department connection, and a wall hydrant for testing of backflow preventer. The sprinkler system shall include an indicating control valve for each sprinkler system riser, a flow switch reporting to the FACP, and an exterior alarm bell. All control valves shall be OS&Y gate type and shall be provided with tamper switches connected to the FACP. Facilities with multiple floors shall be provided with floor control valves for each floor. The floor control valve assembly shall be in accordance with UFC 3-600-01, Figure 4-1.

### 3.1.6.5. Exterior Hose Stream

Exterior hose stream demand shall be in accordance with UFC 3-600-01. This shall be 250 gpm for light hazard and 500 gpm for ordinary hazard. Exterior hose stream demand shall be included in the sprinkler system hydraulic calculations.

### 3.1.6.6. Backflow Preventer

A double check backflow preventer shall be provided on the fire water main serving each building. This shall be located within the building. An exterior wall hydrant with dual hose connections with OS&Y valve shall be provided to allow testing of backflow preventer at design flow as required by NFPA 13.

### 3.1.6.7. Fire Department Connection

A fire department connection shall be provided for each building with sprinkler protection. These shall be located to be directly accessible to the fire department.

### 3.1.6.8. 3.1.6.4 Elevators

The fire protection features of elevators, hoist ways, machine rooms and lobbies shall be in accordance with UFC 3-600-01, ASME A17.1, NFPA 13 and NFPA 72.

### 3.1.6.9. System Components and Hardware

Materials for the sprinkler system, fire pump system, and hose standpipe system shall be in accordance with NFPA 13 and NFPA 20.

### 3.1.6.10. Protection of Piping Against Earthquake Damage

Sprinkler and fire pump piping systems shall be protected against damage from earthquakes. Seismic protection shall include flexible and rigid couplings, sway bracing, seismic separation assemblies where piping crosses building seismic separation joints, and other features as required by NFPA 13 for protection of piping against damage from earthquakes.

3.1.6.11. Fire Water Supply

Fire flow test data is provided in Appendix D.

3.1.6.12. Fire Pump

Refer to paragraph 3.1.9, Electrical and Communication Systems, for requirements.

3.1.6.13. Fire Detection and Alarm

A fire alarm and detection system shall be provided for this facility. It shall comply with the requirements of UFC 3-600-01 and NFPA 72. The system shall be addressable and fully compatible with and integrated with the local base wide central monitoring system.

3.1.6.14. Building Construction

Construction shall comply with requirements of UFC 3-600-01, the International Building Code and NFPA 101.

3.1.6.15. Fire Extinguishers Cabinets and Brackets

Fire Extinguisher cabinets and brackets shall be provided when fire extinguishers are required by UFC 3-600-01 and NFPA 101. Placement of cabinets and brackets shall be in accordance with NFPA 10. Semi-recessed cabinets shall be provided in finished areas and brackets shall be provided in non-finished areas (such as utility rooms, storage rooms, shops, and vehicle bays). Fire extinguishers shall not be provided in this contract.

3.1.6.16. Interior Wall and Ceiling Finishes

Interior wall and ceiling finishes and movable partitions shall conform to the requirements of UFC 3-600-01 and NFPA 101.

3.1.7. Heating, Ventilation, and Air Conditioning (HVAC) Systems

(1) Ventilation System. Ventilation Supply system for the repair and maintenance bays and the vehicle corridor shall be designed to provide 100% of outdoor air with no recirculation and sized for minimum of 1.5 cfm per square foot per ASHRAE 62.1. The ventilation air shall be tempered to 55 degrees (F). CO and NOx sensors shall be provided throughout the repair bays and vehicle corridor. If the sensors register concentrations above acceptable levels they shall initiate an alarm both locally and at the Building Automation System. The general system's fan shall be equipped with a VFD to adjust the exhaust airflow rate based on the operation of the vehicle exhaust systems. The repair and maintenance areas and vehicle corridor shall be maintained at negative pressure with respect to the air conditioned core area. UAV Storage Building, Organizational Storage, Distribution Company Storage, POL Building, mechanical and electrical rooms, the ventilation rate shall be such that the space is maintained at a maximum of 10 degrees (F) above ambient conditions. Air supplied into the air conditioned core area shall be cascaded into adjacent areas for pressurization and to prevent polluted air from entering this area.

(2) System Selection.

(a) Repair and maintenance bays and the vehicle corridor are to be heated to 55 degrees F. The repair and maintenance bays shall be heated by some form of radiant heating; overhead gas infrared, in-floor hydronic, or some combination thereof. Other site storage buildings (see paragraph 3.2.f) are to be heated to 40 degrees F for freeze protection.

(b) Occupied spaces within the core shall be heated and cooled in accordance with Paragraph 5 of Section 01 10 00. Consider all viable alternative systems meeting the functional requirements of each of the areas of the facility. For the core spaces, consider packaged equipment, split systems or systems utilizing chilled/heating water from either a central plant or decentralized sources.

- (c) Return air plenum systems are not allowed for Tactical Equipment Maintenance Facilities.
- (d) Consider use of evaporative air pre-cooling in hot climates.
- (e) Telecommunications Rooms and SIPRNet rooms will each be served by an independent and dedicated air-handling system. Air handling unit system(s) shall not be floor-space mounted within the actual space served. Rooms shall be maintained at 72 degrees F and 50 percent relative humidity year-round. Assume 616 Watts per hour for the equipment heat dissipation. Spacing may be greater than 5' O.C. if portion of building being protected is not in a high volume traffic area. Contractor shall verify this load during the design stage.
- (3) Building Exhaust Systems. Provide general exhaust in repair and maintenance areas and exhaust systems at maintenance area pit, welding area and weapons vault. Welding function is portable but welding exhaust shall be a part of the building construction. Exhaust fan shall be non-sparking. Maintenance area pit exhaust system will be ducted exhaust system with explosion proof fans. Welding exhaust shall be manually engaged during the welding activity. All other exhaust systems will operate continuously while the building is occupied. Exhaust duct openings shall be located so that they effectively remove vapor accumulations at floor level from all parts of the floor area. Exhaust systems shall be in accordance with NFPA 30 and 30A. Energy recovery from exhaust air shall be used in climate zones 3 through 8.
- (4) Vehicle Exhaust Evacuation Systems. Vehicle exhaust evacuation system for wheeled and tracked vehicles shall be provided at each repair area and along the vehicle corridor allowing for capturing exhaust fumes from stationary vehicles and vehicles moving in and out of the building and along the vehicle corridor. Consider viable alternative systems meeting the functional requirements of each of the areas of the facility. Size and locate the exhaust lines as required to service vehicles and equipment within the repair areas. Lines shall not interfere with maintenance operations or obstruct equipment such as the traveling bridge crane. 50% duty cycle of the total available capacity of vehicle exhaust can be considered unless specified otherwise by the using service. The using service is responsible for providing the transition connectors (if required, depending on the type of exhaust system provided) between the vehicle exhaust and the vehicle exhaust system installed in the building. All system components must be compatible with the vehicle exhaust temperatures. Unless otherwise indicated by the user, design exhaust outlets for 1400 cfm and 900 degrees F. For vehicles with higher rate requirements, two exhaust lines may be combined. No exhaust system is currently available that will satisfy the requirements of the AGT 1500 Gas Turbine. Ventilation in the maintenance and repair bays shall be as a minimum per ASHRAE 62.1. Additional makeup air may be needed to compensate for the exhaust requirements.
- (5) HVAC Controls. HVAC Controls shall be in accordance with paragraph 5.8.3. See Appendix for HVAC Controls for typical control system points schedules. These schedules identify as a minimum points to be monitored and controlled by the building automation system (BAS). See paragraph 6 for any additional installation specific points. Points schedule drawings convey a great deal of information critical to design, installation, and subsequent performance of the control system. It includes hardware input/output information, device ranges and settings, ANSI 709.1 communications protocol data, and information about data that is to be used at the operator workstation by Monitoring and Control software. These schedules are available as an excel spread sheet and as AutoCAD drawings on Engineering Knowledge Online (EKO) website <https://eko.usace.army.mil/fa/bas/>. Point schedule of system types not addressed in the appendix shall be developed by the Contractor, and shall be sufficiently detailed to a level consistent to a similar listed system in the appendix. It is recommended that all of the guidance and instruction documents be reviewed prior to using any of the info, as the documents provide necessary and critical information to the use of website drawings and other information.

### 3.1.8. Plumbing

- (1) Trench Drains. Design trench drain for easy cleaning. Provide basket strainers to facilitate trash removal where trench drains discharge to piping systems. Convey waste to exterior oil/water separator prior to discharge to the sanitary sewer system. When a dedicated, partitioned welding area is provided, provide a solid cover to the trench drain where it runs through the welding area.
- (2) Emergency Showers and Eye Washes. See Section 3.1.1 (3) (b) for eye wash, hand held drench hose and emergency shower requirements within the repair and maintenance areas and core area.
- (3) Compressed Air. Provide the compressed air outlets with quick disconnect couplings in all repair and maintenance areas, along the vehicle corridor, at two places in the pit, and in the Consolidated Bench Repair area. Provide one compressed air outlet per bench in Consolidated Bench Repair area. Each drop shall include an isolation valve, filter and pressure regulator, condensate trap with drain cock. Provide air compressor with receiver, refrigerated air dryer, filtration and pressure regulation. The air compressor shall be installed building equipment. Size air compressor for 10 CFM per outlet in repair and maintenance areas and 5 cfm per outlet in the

Consolidated Bench Repair area, with a 60 percent diversity (assume 60% of all drops in the facility will be in use at the same time), plus any additional compressed-air equipment in the facility. Unless otherwise indicated by the user requirements in paragraph 6, provide compressed air at 125 psi.

(4) Sump Pump. Provide sump pump in maintenance pit and elevator pit. Determine if maintenance pit sump pump shall be explosion proof type and provide explosion type, if required. Sump pump shall be submersible type and shall be capable of handling small amounts of oil and anti-freeze. Maintenance pit and elevator pit sumps shall discharge to an oil water separator.

### 3.1.9. Electrical and Telecommunications Systems

See Paragraph 6 for work to be performed by others (work indicated in paragraph 3 shall be a part of this contract unless otherwise indicated in paragraph 6), clarifications and additional requirements for the electric and telecommunications systems.

#### (1) Exterior Electrical Distribution System

(a) Parking Pad and Power Connections. Provide power connections to hardstand for existing equipment as required in Features Matrix.

#### (2) Exterior Lighting

(a) Exterior Lighting General. Exterior lighting systems inside the TEMF security fence shall be provided for sidewalks, roadways, service yards, facility aprons, open storage areas and parking areas. Exterior lighting shall consist of high intensity discharge (HID) light fixtures, mounted on poles located within the AT/FP fence line clear zone and elsewhere as required to attain illumination levels and uniformity. Poles located within the service yards, facility aprons and hardstand parking areas shall be located and protected to minimize damage from vehicles. Building-mounted light fixtures may be used around the building perimeter to supplement pole mounted light fixtures. Building mounted light fixtures used solely for building perimeter and doorway lighting may be fluorescent. Illumination levels shall be 5 foot-candles for areas adjacent to the primary facility and no less than 0.5 foot-candles for parking areas. Exterior lighting shall be controlled by a photosensor or astronomical time clock that is capable of automatically turning off the exterior lighting when sufficient daylight is available or the lighting is not required.

(b) Perimeter Security Lighting. Protective lighting systems shall be provided in response to project specific requirements to deter trespassers and make them visible to guards. Levels of exterior lighting for protected areas shall conform to the requirements in the IESNA Lighting Handbook. Lighting circuits shall be controlled by a photosensor with manual override.

#### (3) Exterior Communication Services

(a) Parking Pad and Data Connections. None required

#### (4) Interior Electrical and Telecommunications

##### (a) Electrical

i. Power Service. In the electrical equipment room provide a space for 3-phase, 200 ampere breaker with additional 3-phase, 200 ampere power capacity for this breaker in the main switch board. Installation shall conform to NFPA 70, National Electrical Code.

ii. Nonlinear Loads. The effect of nonlinear loads such as computers and other electronic devices shall be considered and accommodated as necessary. These loads generate harmonics, which can overload conventionally sized conductors or equipment and thereby cause safety hazards and premature failures. Circuits serving such devices shall be equipped with a separate neutral conductor not shared with other circuits. Panelboards and any dry type transformers shall be rated accordingly.

iii. Lightning Protection System and Transient Voltage Surge Protection. Design shall be in accordance with NFPA 780 and other referenced criteria. Provide transient voltage surge protection. All tactical equipment maintenance facilities are classified as mission essential and continuity of facility services is required for lightning protection risk assessments.

(b) Receptacles. Power receptacles shall be provided per NFPA 70 and in conjunction with the proposed equipment and furniture layouts. Provide power connectivity to each workstation. Provide a duplex receptacle adjacent to each duplex voice/data and CATV outlet.

(c) Special Power Requirements. Electrical power outlets for special power shall be coordinated with workbench locations in shops and provided in the maintenance areas. Both low voltage and high frequency power

may be required in some areas. See the TEMF Features Matrix. Coordinate with the User for the electrical characteristics of the equipment to be provided by the Government.

(d) **Hazardous Locations.** Hazardous locations shall be clearly defined on the drawings by the designer based on the intended use of the facility and applicable criteria. Receptacles, devices, equipment and wiring in hazardous locations shall be designed (UL listed for the application) and installed in accordance with the NFPA codes. When hazardous locations are determined to be up to 18 inches above the finished floor, receptacles and devices and conduit routing to them shall be installed above the hazardous area, where possible.

(e) **Lighting.** Lighting and lighting controls shall comply with the recommendations of the Illumination Engineering Society of North America (IESNA) and the requirements of ASHRAE 90.1.

i. **Office, Training Room and Conference Room Lighting.** Interior ambient illumination shall provide a generally glare free, high quality lighting environment conforming to IESNA RP-1-04. Training rooms and conference rooms shall have a dimmable circuit providing general lighting without glare on audio-video displays. Dimming ballasts shall be capable of dimming to 5 percent.

ii. **Repair and Maintenance Areas.** Illumination of the repair maintenance areas shall consist of T5, T5HO, T8 or solid state fluorescent light fixtures. The fixture layout shall be coordinated with the traveling bridge crane requirements.

iii. **Maintenance Pit Lighting.** Illumination in maintenance pits shall consist of T5, T5HO, T8 fluorescent linear or solid state light fixtures mounted in the pit area for general illumination. Task illumination shall be provided by no fewer than four pit-mounted incandescent, compact fluorescent, or metal halide adjustable, or solid state swing-arm task lights. In lieu of swing-arm task lights, no fewer than two receptacles with cord and plug incandescent, compact fluorescent or metal halide portable safety lights may be provided. Each cord shall be of adequate length to service no less than 60 percent of the pit area. All equipment shall be suitable for the hazardous classification of the pit.

iv. **Illumination Levels.** Maintained Illumination levels shall be in accordance with the Table 4 below. Maintained illumination levels in areas not included in Table 4 shall comply with the recommendations of the IESNA Lighting Handbook. Illumination levels in maintenance pits shall be calculated based on no contribution from the overhead ambient light fixtures.

TABLE 4 ILLUMINATION LEVELS	
FUNCTIONAL AREA	FOOT CANDLES
Administration and Shop Control	50
Warehouse, Storage, and Miscellaneous Rooms	20
Latrines, Showers, and Lockers	20
Break, Training, and Conference	30
Repair and Maintenance Areas	50
Weapons Storage and COMSEC Vaults	50
Maintenance Pit	15
Repair Shops (General Item, Compact Item, Special Environment, Battery, etc.)	50
Electrical/Mechanical Rooms	30

(f) **Telecommunications System including Telecommunications and SIPRNET Minimum Room Sizes - Telecommunication Pathways, Outlets and Cabling.** Telecommunications cabling shall be Category 6 for all voice and data connections unless length of run warrants need for multimode fiber optic cable. Provide number and type

of connectors as defined by the User. Telecommunications outlets and conduits shall be provided in core areas and supply administration areas with a minimum of one outlet in each work area. Each Training Room shall have a voice outlet. Each Training Room shall have a data connection for each seat and for an instructor. Each repair area workstation shall have access to a data connection. In administration and shop control areas provide a voice and data outlet for every workstation. A data outlet shall be provided at each copier location. Provide a single jack outlet for wall mounted GFGI phones in mechanical, electrical, vaults, telecommunications room and corridors. For controlled access facilities, provide outlets for wall mounted GFGI phones at primary entrance. Additional outlet locations may be provided based on coordination with the facility User and where required for HVAC equipment or other equipment. Provide outlets per I3A technical criteria and Table 5 below. Provide Telecommunications and SIPRNET rooms minimum sizes as indicated in Table 5A below.

TABLE 5 OUTLET DENSITIES	
FUNCTIONAL AREA	AREA PER OUTLET (SF)
Administration and Shop Control	80
Latrines, Showers, and Lockers	0
Break, Training, and Conference	80
Repair and Maintenance Areas	500
Weapons Storage and COMSEC Vaults	80
Repair Shops ( Consolidated bench repair, Battery, etc)	80

TABLE 5A - Minimum Size Telecommunications and SIPRNET Rooms for TEMF				
TEMF	Telecommunications Room		SIPRNET Room	
Floor	Width Feet (min)	Square Feet (min)	Width Feet (min)	Length Feet (min)
1st Small	8	150	6	6
1st Medium	8	150	6	6
2nd Medium	8	110	None	None
1st Large	8	150	6	6
2nd Large	8	110	None	None
1st EXLarge	8	150	6	6
2nd EXLarge	8	150	None	None
General Notes: 1. Width is a minimum inside edge of wall to inside edge of wall dimension inside the room. Length shall be greater than or equal to width. 2. The Telecomm room shall not be less than the minimum width and square feet indicated above and the SIPRNET rooms shall not be less than the minimum width not be less than the minimum width and length indicated above. Telecommunications and SIPRNET rooms shall be rectangular in shape.				

(g) Cable Television (CATV). A minimum of two CATV outlets shall be provided in the Break, Training, and Conference Room and Admin and Shop Control Room. The cable television system shall consist of cabling, pathways and outlets. All building CATV systems shall conform to applicable criteria to include I3A Technical Criteria and the UFC 3-580-01 Telecommunications Building Cabling Systems Planning Design.

(h) Audio/Visual Systems

i. Audio/Visual Systems. Provisions (consisting of a power receptacle and conduit for signal wiring) for a GFGI projector shall be provided in each Training Room.



- ii. **Paging Systems.** A paging system shall be provided for the repair areas and maintenance areas with the microphone located in the administration and shop control area. The system shall be zoned for multiple bay operation and shall have input from the telephone system.
- (i) **Security Infrastructure.** The security infrastructure shall be installed to support GFGI equipment including cameras, door alarms, and motion sensors.
- i. **Intrusion Detection and Security Systems.** Provision for user provided ICIDS intrusion detection and security systems are required for secure and restricted areas including the arms vault, COMSEC vault and SIPRNet room. Provisions shall include dedicated power circuits, telecommunications connections, and raceways and signal wiring for user installed devices. System requirements shall be coordinated with the Installation Security Office.
- ii. **Access Control System.** The access control system shall consist of proximity sensors throughout the facility with varying levels of security. System requirements shall be coordinated with the Installation Security Office.
- (j) **Mass Notification System (MNS).** A mass notification system shall be provided as required by UFC 4-010-01.
- (k) **Grounding.** Each maintenance building shall have a ground counterpoise around the building perimeter for grounding incoming service, building steel, lightning protection, telephone service, piping, and internal grounding requirements. Ground busbar shall be provided on walls of each repair area. A grounding point shall be provided in each repair area and each maintenance area. Each repair area and maintenance area is 16' x 32' in size. Grounding points shall be provided in vehicle and equipment parking areas on 40-foot centers (maximum) and coordinated parking layout. It will be acceptable to provide a minimum of one grounding point for every eight vehicles parked in a double row, and one grounding point for every four vehicles parked in a single row configuration. Equipment parking grounding shall be in accordance with the recommendations of MIL-HNBK-419A, which is referenced in I3A. This includes, but is not limited to, the earth electrode subsystem should exhibit a resistance to earth of 10 ohms or less and multiple ground rods should be interconnected using 1/0 AWG bare copper cable. Install an interior #2 AWG bare tinned copper ground loop around the perimeter of the Fluid Distribution Room for dissipation of potential static charge. Bond ground loop to building structure and grounding riser. Provide thirty (30) #6 AWG bare copper pigtailed complete with alligator clips on both ends for grounding of metallic barrels/dispensing equipment. Length of pigtailed should be based on potential layout of equipment/drums and the location of ground ring. Additional grounding may be provided based on project requirements. Systems shall conform to NFPA 70 National Electrical Code, NFPA 780 Standard for the Installation of Lightning Protection Systems, local codes and the Technical Criteria for Installation Information Infrastructure Architecture (I3A).
- (l) **SIPRNET.** The SIPRNET room shall be designed and constructed in accordance with the "Building SIPRNET Communication Room – New Construction Guidance", paragraph of the Technical Guide for Integration of SIPRNET (Secret Internet Protocol Router Network). The SIPRNET room design and construction shall be coordinated with local NEC and Physical Security Office. SIPRNET conduit and cable to SIPRNET Drops and the SIPRNET Drops will be provided in the future and is not to be provided as part of this scope of work. Connection to the main telecommunications room from the SIPRNet room shall be via a 2-inch trade size steel conduit. Provide six strands of single mode fiber optic cable from Telecommunications Room to the SIPRNET Room. Provide a communications signal ground bus bar connected to the main communications room signal bus bar via a properly sized ground wire (see MIL-HDBK-419-A, which is referenced in the Technical Guide for the Integration of SIPRNET). Provide one dedicated standard 20-amp duplex receptacle for future SIPRNET rack in addition to convenience receptacles in the SIPRNET room.
- (m) **Hydraulic Lift.** In each pair of repair areas, provide electric power for User provided (GFGI) portable hydraulic lift. Coordinate electrical requirements with the User.
- (n) **Fire Detection and Alarm**
  - i. A fire alarm and detection system shall be provided for this facility. It shall comply with the requirements of UFC 3-600-01 and NFPA 72. The system shall be addressable and fully compatible with and integrated with the local installation wide central monitoring system. Coordinate fire alarm system requirements with the Fire Department's Representative during design.
  - ii. All initiating devices shall be connected, Class A, Style 6, to signal line circuits (SLC). All alarm appliances shall be connected to notification appliance circuits (NAC), Class A. A looped conduit system shall be provided so that if the conduit and all conductors within are severed at any point, all NAC and SLC shall remain functional.
  - iii. Breakglass manual fire alarm stations shall not be used.

iv. Over-voltage and surge protection shall be provided at the input power of all panels.

### 3.1.10. Energy Conservation

3.1.10.1. **Energy Performance.** The building, including the building envelope, HVAC, ventilation and exhaust systems, service water heating, power, and lighting systems shall be designed to achieve a non-plug energy consumption that is at least 40% below the consumption of a baseline building meeting the minimum requirements of ANSI/ASHRAE/IESNA Standard 90.1 (see paragraph 5.9 Energy Conservation). (Note: Plug loads shall be included in building energy modeling but are subtracted in the final calculation of Energy Performance. See section “Design After Award” for additional guidance).

3.1.10.2. **Required Energy Conservation Features.** All items listed in the energy conservation features table shall be provided as a minimum. Additional energy conservation features may be required to meet the above energy performance. The contractor is responsible for determining and providing additional energy conservation features to meet the energy performance requirement.

**Climate Zone 3A, Energy Conservation Features Table**

Item	Component	Minimum Requirements
<b>Roof</b>	Insulation above deck	
	Metal building roof	R-13 + R-13
	Surface reflectance	0.65
<b>Walls</b>	Steel-framed	
	Metal building	R-13
<b>Slabs</b>	Unheated	NR
	Heated	R-10
<b>Doors</b>	Swinging	U-0.70
	Non-Swinging	U-0.25
<b>Infiltration</b>		0.5 ACH
<b>Vertical Glazing</b>	Window to Wall Ratio (WWR)	< 10%
	Thermal transmittance	U-0.45
	Solar heat gain coefficient (SHGC)	0.44 – N; 0.31 – S, E, W
	South Overhangs	NR
<b>Skylights</b>	Percent roof area	2%
	Thermal transmittance	U-0.69
	SHGC	0.19
<b>Interior Lighting</b>	Lighting Power Density	See Note 3
	Ballast	Electronic ballast
	Daylighting controls <sup>4</sup>	Yes
	Automatic Lighting Shutoff	Occupancy sensors for all unoccupied spaces and where feasible for all occupied spaces
<b>Ducts</b>	Sealing	Seal class B
	Location	Interior only
	Insulation level <sup>5</sup>	R-6
<b>Service Water Heating</b>	Gas storage	90% E <sub>t</sub>

1. Not Used

2. NR means there is no requirement or recommendation for a component in this climate.

3. Lighting power densities in accordance with the following table:

### **Lighting Power Densities**

Zone	Baseline	Minimum Requirements
Repair Bay	1.7 W/ft <sup>2</sup> (18.3 W/m <sup>2</sup> )	1.3 W/ft <sup>2</sup> (14.0 W/m <sup>2</sup> )
Vehicle Corridor	0.7 W/ft <sup>2</sup> (7.5 W/m <sup>2</sup> )	0.7 W/ft <sup>2</sup> (7.5 W/m <sup>2</sup> )
Showers	Use ASHRAE 90.1	0.6 W/ft <sup>2</sup> (6.5 W/m <sup>2</sup> )
Storage 1	Use ASHRAE 90.1	0.9 W/ft <sup>2</sup> (9.7 W/m <sup>2</sup> )
Consolidated Bench	1.9 W/ft <sup>2</sup> (20.5 W/m <sup>2</sup> )	1.3 W/ft <sup>2</sup> (14.0 W/m <sup>2</sup> )
Storage 2	Use ASHRAE 90.1	0.9 W/ft <sup>2</sup> (9.7 W/m <sup>2</sup> )
Office	Use ASHRAE 90.1	0.9 W/ft <sup>2</sup> (9.7 W/m <sup>2</sup> )

4. Daylighting should be included in the repair bays, vehicle corridor, and office.
5. The duct and pipe insulation values are from the ASHRAE Advanced Energy Design Guide for Small Offices.

System	Minimum Requirements	
	Fan Motor	Total Fan
Repair Bay	0.90	0.45
Vehicle Corridor	0.90	0.45
Showers	0.85	0.34
Storage 1	0.85	0.34
Consolidated Bench	0.90	0.45
Storage 2	0.85	0.34
Office	0.85	0.34
Fan Coil Units	0.85	0.34

### 3.1.10.3. Compliance Documentation

The required energy conservation features shown in the table above contributes to the achievement of the above energy performance and are life cycle cost effective for a TEMF. Use of the required energy conservation features does not eliminate the requirement for energy analysis calculations documenting compliance. The design-build contractor must document compliance with the above energy performance utilizing the methodology described in ASHRAE 90.1 Appendix G as discussed in section 01 33 16, Design After Award. The design analysis shall document each of the features selected to achieve the specified energy performance.

3.1.10.4. Schedules. The following load schedules must be used in all facility energy simulations for purposes of showing compliance with Paragraph 3.1.10.1.

Hr	Occupancy			Lighting			Plug Loads			Service Hot Water		
	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun	Wk	Sat	Sun
1	0	0	0	0.04	0.04	0.04	0.2	0.2	0.2	0.03	0.03	0.03

Hr	Occupancy			Lighting			Plug Loads			Service Hot Water		
2	0	0	0	0.04	0.04	0.04	0.2	0.2	0.2	0.03	0.03	0.03
3	0	0	0	0.04	0.04	0.04	0.2	0.2	0.2	0.03	0.03	0.03
4	0	0	0	0.04	0.04	0.04	0.2	0.2	0.2	0.03	0.03	0.03
5	0	0	0	0.04	0.04	0.04	0.2	0.2	0.2	0.03	0.03	0.03
6	0	0	0	0.04	0.04	0.04	0.2	0.2	0.2	0.03	0.03	0.03
7	0	0	0	0.04	0.04	0.04	0.2	0.2	0.2	0.03	0.03	0.03
8	0.15	0	0	0.4	0.04	0.04	0.5	0.2	0.2	0.1	0.03	0.03
9	0.7	0	0	0.9	0.04	0.04	0.8	0.2	0.2	0.7	0.03	0.03
10	0.9	0	0	0.9	0.04	0.04	0.9	0.2	0.2	0.7	0.03	0.03
11	0.9	0	0	0.9	0.04	0.04	0.9	0.2	0.2	0.7	0.03	0.03
12	0.9	0	0	0.9	0.04	0.04	0.9	0.2	0.2	0.7	0.03	0.03
13	0.5	0	0	0.8	0.04	0.04	0.8	0.2	0.2	0.7	0.03	0.03
14	0.85	0	0	0.9	0.04	0.04	0.9	0.2	0.2	0.7	0.03	0.03
15	0.85	0	0	0.9	0.04	0.04	0.9	0.2	0.2	0.7	0.03	0.03
16	0.85	0	0	0.9	0.04	0.04	0.9	0.2	0.2	0.7	0.03	0.03
17	0.2	0	0	0.9	0.04	0.04	0.9	0.2	0.2	0.2	0.03	0.03
18	0	0	0	0.3	0.04	0.04	0.4	0.2	0.2	0.03	0.03	0.03
19	0	0	0	0.04	0.04	0.04	0.2	0.2	0.2	0.03	0.03	0.03
20	0	0	0	0.04	0.04	0.04	0.2	0.2	0.2	0.03	0.03	0.03
21	0	0	0	0.04	0.04	0.04	0.2	0.2	0.2	0.03	0.03	0.03
22	0	0	0	0.04	0.04	0.04	0.2	0.2	0.2	0.03	0.03	0.03
23	0	0	0	0.04	0.04	0.04	0.2	0.2	0.2	0.03	0.03	0.03
24	0	0	0	0.04	0.04	0.04	0.2	0.2	0.2	0.03	0.03	0.03

## 3.1.11. Equipment and Furniture:

(a) Equipment and furniture are necessary to make TEMF ready for daily operations. Some items are provided as integral parts of the building construction. Most furniture and equipment must be provided by others. Table 6 shows typical contract provided equipment that is needed to make TEMF ready for operations.

TABLE 6 INSTALLED BUILDING EQUIPMENT		
Area	Equipment Class <sup>1</sup>	Equipment/Furniture Item
Repair Areas	CFCI CFCI CFCI	Exhaust System Bridge Crane Compressed Air
Maintenance Areas	CFCI CFCI CFCI CFCI CFCI	Bridge Crane Maintenance Pit Compressed Air Dispensing/Disposal System Emergency Eye Wash, hand wash and shower station
Administration and Shop Control	CFCI CFCI	Window/Reception Counter Fire Extinguisher Cabinets
Consolidated Bench	CFCI	Compressed Air

Tool Room	CFCI	
Tool Box Storage	CFCI	Window/Reception Counter
Combat Spares	CFCI	Window/Reception Counter
Latrines, Showers & Lockers	CFCI	Lockers and Benches
Break, Training, Conference Room	CFCI	Counter with Sink
Weapons & COMSEC Vaults	CFCI	Vault Door
Site	CFCI	Oil/Water Separator

Note (1): CFCI is Contractor Furnished/Contractor Installed equipment. This equipment is always MCA funded and is part of the construction contract.

(b) Furniture Systems. The following criterion describes the furnishing requirements for all room types. Furnishings, other than installed building equipment, are to be Government-furnished and Government-installed (GFGI) unless otherwise specified in this document. The following furnishings table is provided for coordination of room and office layouts to ensure suitability for their intended function.

**Table 7: Room Size and Furnishings Chart**

Table 7- Room Size and Furnishings Chart				
Room	Description	NSF	Comments	Furniture Required
Admin & Shop Control	Administration & Shop Control	Varies	OPEN-PLAN OFFICE	Systems furniture open plan office area with workstations, approx. 64 SF, with work surfaces, file drawers and overhead storage each for six staff members in Small TEMF, 16 staff members in Medium TEMF, 40 staff members in Large TEMF, and 57 staff members in Extra Large TEMF. Records section to have min. of 1 LF of 4 –drawer horizontal file cabinet for every 4 SF of room (250 SF room = min. 62.5 LF 4-drawer horizontal base files).
TRAINING ROOM	Training Room	1080	CLASSROOM	1 desk and chair for each 20 SF to accommodate min. 30 students.
BREAK ROOM/ CONF/ TRAIN	Break Room/ with adjacent Multi-purpose Space	Varies	STAFF BREAK AREA & CONFERENCE ROOM	Min. 10 LF base and wall cabinets with space for commercial grade refrigerator with ice maker. Provide seating and tables to accommodate approx. 40 percent of the building occupants.
ARMS VAULT	Class 5A Vault	300	CONSTRUCTED IN ACCORDANCE WITH AR 190-11, APP G.	1 desk to accommodate a computer, 1 task chair, 1 bookcase for manuals, one 4-drawer file cabinet, and 1 work bench.

**Table 7- Room Size and Furnishings Chart**

Room	Description	NSF	Comments	Furniture Required
COMSEC VAULT	Class 5V Vault	300	CONSTRUCTED IN ACCORDANCE WITH AR 380-5.	1 desk to accommodate a computer, 1 task chair, 1 bookcase for manuals, 4 lockable metal cabinets with shelves, two 4-drawer file cabinets, industrial shelving approximately 10'wx4'dx6'h each.
COMBAT SPARES	Spare Parts	Varies	STORAGE ROOM	1 desk to accommodate a computer, 1 task chair, one 4-drawer file cabinet, and 4 lockable metal cabinets with shelves.
TOOL ROOM	Tools and Tool Set Storage	Varies	STORAGE ROOM	1 desk to accommodate a computer, 1 task chair, one 4-drawer file cabinet, and 4 lockable metal cabinets with shelves.
SECURE STOR.	Secure Storage	300	CONSTRUCTED IN ACCORDANCE WITH RISK LEVEL II ANALYSIS OF AR 190-51.	4 lockable metal cabinets with shelves and industrial shelving approximately 10'wx2'dx6'h each - 1 for small TEMF, 2 for medium, 3 for large, and 4 for extra large.
CONSOLD. BENCH REPAIR	Consolidated Bench Repair	Varies	WORK AREA	Min. 16 SF of Static-Free work bench space for each assigned repair technician – 6 for small TEMF, 20 for Medium, 36 for Large, and 71 for Extra Large.

### 3.2. FUNCTIONAL AND OPERATIONAL REQUIREMENTS

(a) Not Used

(b) Medium TEMF. The nominal square footage (NSF) shown for each space below is used for programming purposes, and as a basis for computing the maximum allowable gross area of the facility. The floor plan provided should be used for building layout.

<b>MEDIUM TEMF</b>							
<b>CORE ANALYSIS BY FUNCTIONAL AREA</b>				<b>NUMBER OF PERSONNEL</b>		<b>NSF</b>	
Administration & Shop Control				16		2,100	
Training Room				0		1,080	
Consolidated Bench				20		2,100	
Combat Spares				0		500	
Tool Room				0		500	
Tool Box Storage				0		300	
Latrine				0		2,700	
Break, Training & Conference				0		600	
Weapons Vault				0		300	
COMSEC Vault				0		300	
Secure Storage				0		300	
Telecommunications Room (NIPRNet)				0		150	
Telecommunications Room (SIPRNet)				0		150	
<b>Core Area (NSF)</b>				<b>36</b>		<b>11,080</b>	
<b>REPAIR</b>	<b>AREA</b>	<b>ANALYSIS</b>	<b>BY</b>	<b>NUMBER OF</b>	<b>NUMBER OF</b>	<b>WORK</b>	<b>NSF</b>

FUNCTIONAL AREA	PERSONNEL	CIRCULATION AREAS	AREAS (512 NSF)	
Repair Areas	40		14	7,168
Maintenance Areas			16	8,192
Welding Area			2	1,024
Total Work Areas			32	16,384
Circulation Area		1		768
<b>Total Repair Area (NSF)</b>	<b>40</b>	<b>1</b>	<b>32</b>	<b>17,152</b>
<b>SHOP TOTAL</b>	<b>NUMBER OF PERSONNEL</b>	<b>NUMBER OF CIRCULATION AREAS</b>	<b>WORK AREAS (512 NSF)</b>	<b>NSF</b>
<b>Non-Assignable &amp; Utilities Factor</b>				<b>1.25</b>
<b>SHOP TOTAL (GSF)</b>	<b>76</b>	<b>1</b>	<b>32</b>	<b>35,290</b>
<b>FLOOR PLAN AREA SHOWN</b>				<b>35,290</b>

(c) Not Used

(d) Not Used

## (e) Architectural TEMF Features Matrix

ARCHITECTURAL TEMF FEATURES MATRIX	COLUMN-FREE SPACE	WIRE MESH ENCLOSURE	STUDWALL PARTITIONS	CONC/CMU IMPACT RESISTANT PARTITIONS	GYPBOARD IMPACT RESISTANT PARTITIONS	WINDOWS TO REPAIR BAYS	WINDOWS TO EXTERIOR	VINYL COMPOSITION TILE	CONCRETE FLOOR HARDENER	CERAMIC TILE FLOOR	PAINTED WALLS	WALL CORNER GUARDS	FINISHED CEILING	MOISTURE RESISTANTCEILING	EXPOSED STRUCTURE OVERHEAD	CEILING HEIGHT 9 FT.	CEILING HEIGHT 12 FT.	10 TON CRANE-HOOK HEIGHT 20 FT(Notes 4)	35 TON CRANE-HOOK HEIGHT 25 FT(Notes 4)	OPERABLE WINDOW FOR TESTING SIGHTS	LOCKERS	OVERHEAD COILING DOORS - 10 FT. X 10 FT.	OVERHEAD COILING DOORS - 24 FT. X 14 FT- 0 IN.	BOLLARDS @ OH DOORS INSIDE/OUTSIDE	GSA CLASS 5 VAULT DOOR	MAINTENANCE PIT	ISSUE WINDOW WITH COUNTER & COILING DOOR	BUILT-IN STORAGE BINS
	FUNCTIONAL AREAS																											
ADMIN & SHOP CONTROL			1			•	•	•			•	•	•			•												
UNASSIGNED			1			•	•	•			•	•	•			•												
TOOL ROOM		3			•				•		•	•					•										•	
TOOL BOX STORAGE		3			•				•		•	•					•										•	
COMBAT SPARES		2			•				•		•	•					•										•	
LATRINES, SHOWERS, LOCKERS					•					•	•	•		•		•					•							
TRAINING ROOM			•				•	•			•	•	•			•												
BREAK, TRAINING & CONF			•				•	•			•	•	•			•												
CONSOLIDATED BENCH REPAIR				•					•		•	•	•					•		•		•						
WEAPONS STORAGE VAULT		2		•					•		•	•					6							•				
COMSEC VAULT		2		•					•		•	•					6								•			
NONSENSITIVE SECURE STORAGE				•					•		•	•					•											
COMMUNICATION VEHICLE DOCK																												
CORRIDOR				•				5			•	•	•			•												
MECHANICAL ROOM				•					•		•	•					•											
ELECTRICAL ROOM				•					•		•	•					•											
COMMUNICATIONS ROOM					•				•		•	•					•											
SIPRNet ROOM									•		•	•					•											
FLUID DISTRIBUTION									•		•					•						9		•				
REPAIR AREAS	•								•						•			•	•				•	•				
MAINTENANCE AREAS	•								•		•				8			•	•				•	•		•		
HARDSTAND																												
ORG STORAGE	•	•							•		•				•							•						
UAV STORAGE BUILDING	•								•		•				•								•					
DISTRIBUTION COMPANY SUPPLY BLDG		•	•						•		•				•							•						
HAZ WASTE & POL STORAGE BUILDINGS	•	•							•		•				•							•						

**Notes for Architectural TEMF Features Matrix**

1. Lightweight, non-bearing partitions removable to rearrange space
2. Wire mesh partitions to subdivide where required
3. Wire mesh enclosed for tool storage to facilitate interaction of mechanics and tool room keeper, and for relocation flexibility.
4. Provide either a 10-ton or a 35-ton top running bridge crane for one wing of repair areas and maintenance areas as noted in para. 2.1.
5. VCT in corridor on 2<sup>nd</sup> Floor (except Small TEMF).



6. Provide top of Concrete Cap at 12'-0". Provide an additional dropped ceiling to protect weapons and COMSEC equipment under repair. Top of caps shall be secure from unauthorized access.
7. All Finishes are considered minimum finishes only.
8. The Maintenance Corridor through the Core Area shall have a minimum 14'-0" clear Ceiling Height.
9. Roll-up doors or double doors may be provided for exterior access to the Fluid Distribution Room based on User preference.

## (f) Mechanical TEMF Features Matrix

MECHANICAL TEMF FEATURES MATRIX	HVAC	HEAT	VENTILATE	AIR CONDITION	VEHICLE EMISSIONS EXHAUST SYSTEM	PLUMBING & FIRE PROTECTION	LAVATORY OR SINK	HOSE BIBB	WASH FOUNTAIN	WATER CLOSET	URINAL	SHOWERS	COMPRESSED AIR	EMERGENCY SHOWER & EYEWASH	SPRINKLER SYSTEM	TRENCH DRAIN AT DOORS	FLOOR DRAIN	MISCELLANEOUS	STEAM CLEANING FOR PARTS/ENGINES	WELDING AND/OR MACHINIST AREA	POL DISPENSING HOSE WITH REEL SYSTEM	ENVIRONMENTAL	OUT OF SPEC WASTE FUEL STORAGE	WASTE OIL STORAGE	WASTE ANTIFREEZE STORAGE/RECYCLE
	FUNCTIONAL AREAS																								
	ADMIN & SHOP CONTROL		•		•										•										
	UNASSIGNED		•		•										•										
	TOOL ROOM		•		•										•										
	TOOL BOX STORAGE		•		•										•										
	COMBAT SPARES		•		•										•										
	LATRINES, SHOWERS, LOCKERS		•	•	•			•	•	8	•	•	•		•			•							
	TRAINING ROOM		•		•											•									
	BREAK, TRAINING & CONF		•		•			•								•									
CONSOLIDATED BENCH REPAIR		•		•									•	•	•		7								
WEAPONS STORAGE VAULT		•		•											•										
COMSEC VAULT		•		•											•										
NONSENSITIVE SECURE STORAGE		•	•												•										
COMMUNICATION VEHICLE DOCK																									
CORRIDOR		•		•											•										
MECHANICAL ROOM	4	•						•							•		•								
ELECTRICAL ROOM	4	•													•										
COMMUNICATIONS ROOM				•											•										
SIPRNet ROOM				•											•										
FLUID DISTRIBUTION		•	•					•					•		•										
REPAIR AREAS		•	•		•			•	8				•	•	•	•	7		5	1			3	3	3
MAINTENANCE AREAS		•	•		6			•					•	•	•	•	7				•		3	3	3
HARDSTAND																									
ORG STORAGE		4	•												•										
UAV STORAGE BUILDING		4	•												•										
HAZ WASTE & POL STORAGE BUILDINGS			•																						
DISTRIBUTION COMPANY STORAGE FAC		4	•												•										

**Notes for Mechanical TEMF Features Matrix**

1. Welding exhaust system in one pair of repair areas. This area will also accommodate machinist function.
2. Not Used
3. Provide secondary containment in tanks outside of building.
4. Heat for freeze protection only.
5. Provide water and power connections for hook-up of user procured (GFGI) portable steam cleaner for cleaning of engines and engine components in a pair of repair areas.
6. Provide non-sparking explosion proof exhaust from pit.
7. Convey waste water through an oil/water separator prior to discharge to sanitary sewer.
8. Provide wash fountain in 8 FT circulation bay adjacent to the core area, or outside the latrines in the core area as shown on the drawings.

## (g) Electrical TEMF Features Matrix

ELECTRICAL/ TELECOMMUNICATIONS TEMF FEATURES MATRIX	POWER	28V DC	120V SINGLE PH	208V SINGLE PH	208-230V 3 PH	208V-400 HZ	208V, 3PH, 50 HZ	FILTERED POWER	GROUND BUSBAR ON WALL	GROUNDING POINTS IN FLR OR HARDSTAND	COMMUNICATIONS	TELEPHONE	DATA CONNECTION	INTERCOM/PAGING/MASS NOTIFICATION	INTRUSION DETECTION SYSTEM	PANABLE ZOOM CAMERA	CATV	LIGHTING	FLUORESCENT	(HID) METAL HALIDE	EXPLOSION PROOF FLUORESCENT	(HID) HIGH PRESSURE SODIUM
	FUNCTIONAL AREAS																					
	ADMIN & SHOP CONTROL			•								•	•	•			•		•			
	UNASSIGNED			•								•	•	•			•		•			
	TOOL ROOM			•		12						•	•	•					•			
	TOOL BOX STORAGE			•								•	•	•					•			
	COMBAT SPARES			11									•	•	•					•		
	LATRINES, SHOWERS, LOCKERS			•									•	•	•					•		
	TRAINING ROOM			•									•	•	•			•		•		
	BREAK, TRAINING & CONF			•									•	•	•			•		•		
CONSOLIDATED BENCH REPAIR		•	•					•	•			•	•	•			•		•			
WEAPONS STORAGE VAULT			•									•	•	•	•				•			
COMSEC VAULT			•						•			•	•	•	•				•			
NONSENSITIVE SECURE STORAGE			•									•	•	•					•			
COMMUNICATION VEHICLE DOCK			•		5				•			•	•	•						•		
CORRIDOR			•									•	•	•					•			
MECHANICAL ROOM			•									•	•						•			
ELECTRICAL ROOM			•									•	•						•			
COMMUNICATIONS ROOM			•						•			•	•						•			
SIPRNet ROOM			•						•			•			•				•			
FLUID DISTRIBUTION			•									•	•	•					•			
REPAIR AREAS	1	•	•	10	•		4		•	•			•	•		7			•			
MAINTENANCE AREAS		•	•	•	•		4		•	•			•	•		7			•		8	
HARDSTAND					2,6	3				•			•									
ORGANIZATIONAL STORAGE			•									9							•			
UAV STORAGE BLDG		•	•						•			•	•						•			
HAZ WASTE & POL STORAGE BUILDINGS			•																•			
DISTRIBUTION COMPANY STORAGE BLDG			•									9							•			

**Notes for Electrical TEMF Features Matrix**

1. Provide power connections for hook-up of user procured (GFGI) portable steam cleaner for cleaning of engines and engine components in a pair of repair areas. Coordinate power requirements with the User.
2. MILVANS (100A), TOE vans (50A), Hospital (100A, 208V, 3-PH, 5-Wire).
3. LCSS Vans (to be discontinued in future), Patriot Missile Units.
4. For Engineers shop.
5. Communications Vans (100A).
6. Hospital units require 120/208V, 3-PH, 5-Wire connection

7. Provide power and conduit and wiring system(s) for user provided panable zoom camera system; monitored in Admin and Shop Control.
  8. Lighting classification for pit lighting shall be determined during the design.
  9. Provide 1-4" conduit with a 6 pair copper cable to the Distribution Company
- Storage and Organizational Storage Buildings from the main communications room in the TEMF. Conduit and cable routing may be to the nearest telecommunications maintenance hole before routing cable back to the TEMF main communications room. Provide Protected Entrance Terminal (PET) with one 110 type block mounted on a 4 ft by 8 ft backboard mounted vertically. Backboard treatment shall be in accordance with I3A. Provide one wall mounted telephone outlet inside the building. Ground PET in accordance with 250.50 and 800.100 of NFPA 70 National Electrical Code.
10. Provide 208V single phase power in all Repair Areas and with weather proof connection for tire changing machine where shown on the TEMF Standard Drawings.
  11. ASLMS Containers
    - a) The ASLMS Container is provided with the following:
      - 1) Each ASLMS container comes with a set of two – 150 foot cables with each end plug identical. MS part number for the plug used on cable is MS3456W16-10P.
      - 2) Electrical circuit is 20 ampere, 120 volt, single phase.
    - b) Provide the following power provisions for each ASLMS container:
      - 1) Two dedicated 20 ampere, 120 volt, single phase circuits with a special receptacle for each circuit. MS part number for special receptacle to be provided is MS3451W16-10S.
  12. SATS Containers
    - a) The SATS Container is provided with the following:
      - 1) Integrated 10 KW generator (208V, 3 phase 60 Hz)
      - 2) A wall mounted 100 Amp, 208 volt, 3-phase, 60 Hz AC conforming to MIL-C-22992, Class L, Style P comprised of a MS90558 C 44 4 shell, with an MS14055 insert having insert arrangement 44-12, along with a MS90564 44 C weather-tight cover.
      - 3) Signal entry panel (SEP) with the following connections: RS 232 Male/Female small and large, RJ 11 (phone), RJ 45 (LAN), 10 Base 2 (BNC), and 10 Base T (Ethernet).
    - b) Provide the following power and data provisions for each SATS container:
      - 1) A branch circuit sized to the full load capacity of the 10kw generator to a weatherproof wall mounted 100 amp disconnect switch located within the cable's reach.
      - 2) A pre-manufacturer cable, stock number 5995-01-435-8697. This cable is 50 foot long with a plug for the SATS receptacle at one end and terminal connections on the other end. Connect the cable's terminal ends to the disconnect switch. Provide a means to hang the cable.
      - 3) A weatherproof RJ 45 (phone) and RJ 45 (LAN) outlet with the conduit and cables (Category 6) to the Communication Room and connect per I3A requirements. Provide 50 feet of exterior cable with appropriate connectors on each end for each outlet. Provide a means to hang the cables.
- 3.3. References
- (1) 40 CFR 261, Identification and Listing of Hazardous Waste
  - (2) 40 CFR 262, Standards Applicable to Generators of Hazardous Waste
  - (3) 40 CFR 264, Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
  - (4) American Society of Mechanical Engineers (AMSE)  
ASME HST-1, Performance Standard for Electric Chain Hoists  
ASME HST-4, Performance Standard for Overhead Electric Wire Rope Hoists
  - (5) ANSI Z358.1, American National Standard for Emergency Eyewash and Shower Equipment
  - (6) Not used.
  - (7) AR 190-11, Physical Security of Arms, Ammunition, and Explosives (FOUO)
  - (8) AR 190-51, Security of Unclassified Army Property (Sensitive and Nonsensitive)

(9) AR 380-5, Department of the Army Information Security Program

(10) Crane Manufacturers Association of America (CMAA)

CMAA 70, Top Running and Bridge and Gantry Type Multiple Girder Electric Overhead Traveling Cranes, No. 70

CMAA 74, Top Running and Under Running Single Girder Electric Overhead Cranes

Utilizing Under Running Trolley Hoist, No. 74

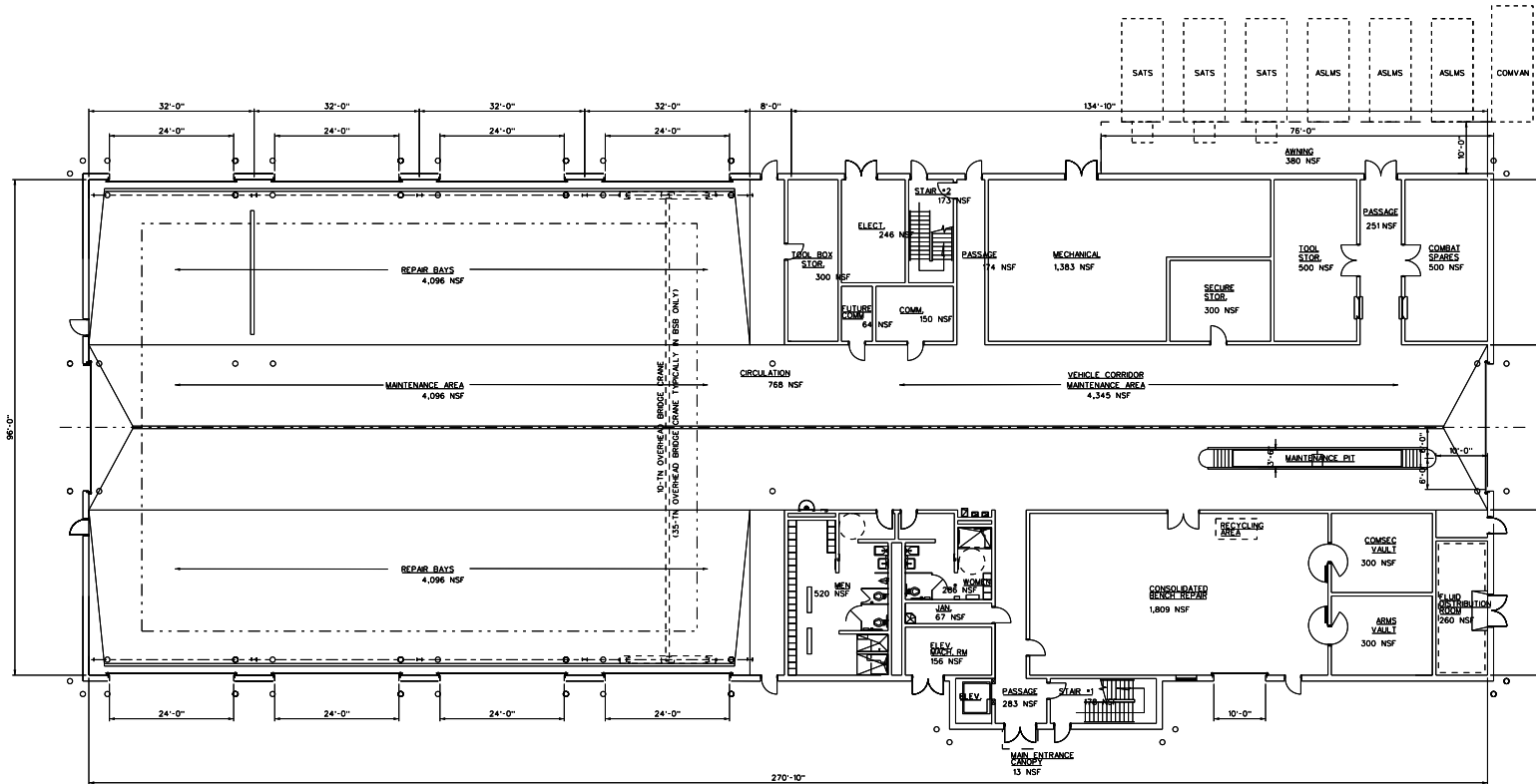
(11) Fed Spec AA-V-2737, Modular Vault Systems

(12) UFC 4-020-01 DoD Security Engineering Facilities Planning Manual

(13) UFC 3-550-1 Exterior Electrical Power Distribution

(14) AR 380-40, Policy for Safeguarding and Controlling Communications Security (COMSEC) Material (FOUO).

(15) USACE STD 872-90-03, FE6 Chain-Link Security Fence Details



### LOWER LEVEL FLOOR PLAN

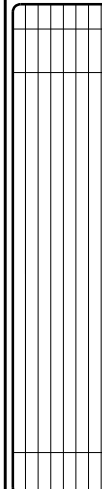


LOWER LEVEL	27,736 SF
UPPER LEVEL	7,554 SF
<u>TOTAL SF</u>	<u>35,290 SF</u>

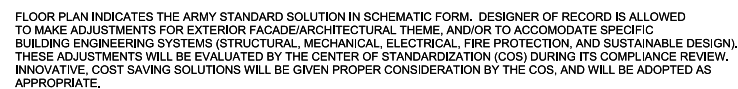
FLOOR PLAN INDICATES THE ARMY STANDARD SOLUTION IN SCHEMATIC FORM. DESIGNER OF RECORD IS ALLOWED TO MAKE ADJUSTMENTS FOR EXTERIOR FACADE/ARCHITECTURAL THEME, AND/OR TO ACCOMMODATE SPECIFIC BUILDING ENGINEERING SYSTEMS (STRUCTURAL, MECHANICAL, ELECTRICAL, FIRE PROTECTION, AND SUSTAINABLE DESIGN). THESE ADJUSTMENTS WILL BE EVALUATED BY THE CENTER OF STANDARDIZATION (COS) DURING ITS COMPLIANCE REVIEW. INNOVATIVE, COST SAVING SOLUTIONS WILL BE GIVEN PROPER CONSIDERATION BY THE COS, AND WILL BE ADOPTED AS APPROPRIATE.

AREAS SHOWN ON THE FLOOR PLAN ARE TO BE CONSIDERED NET PROGRAM REQUIREMENTS. MAXIMUM ALLOWABLE GROSS BUILDING AREA IS THE MAXIMUM GROSS SPACE PERMISSIBLE FOR THE FACILITY.

A REDUCED OVERALL GROSS AREA IS ACCEPTABLE IF ALL NET PROGRAM REQUIREMENTS AND ADJACENCIES ARE MET.

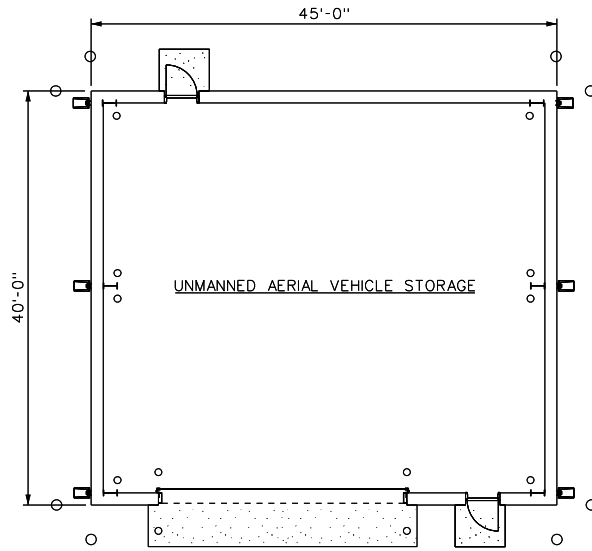


7,554 SF



AREAS SHOWN ON THE FLOOR PLAN ARE TO BE CONSIDERED NET PROGRAM REQUIREMENTS. MAXIMUM ALLOWABLE GROSS BUILDING AREA IS THE MAXIMUM GROSS SPACE PERMISSIBLE FOR THE FACILITY.

A REDUCED OVERALL GROSS AREA IS ACCEPTABLE IF ALL NET PROGRAM REQUIREMENTS AND ADJACENCIES ARE MET.



## FLOOR PLAN

1,800 GSF





#### 4.0 APPLICABLE CRITERIA

Unless a specific document version or date is indicated, use criteria from the most current references, including any applicable addenda, unless otherwise stated in the contract or task order, as of the date of the Contractor's latest accepted proposal or date of issue of the contract or task order solicitation, whichever is later. In the event of conflict between References and/or Applicable Military Criteria, apply the most stringent requirement, unless otherwise specifically noted in the contract or task order.

##### 4.1. INDUSTRY CRITERIA

Applicable design and construction criteria references are listed in Table 1 below. This list is not intended to include all criteria that may apply or to restrict design and construction to only those references listed. See also Paragraph 3 for additional facility-specific applicable criteria.

**Table 1: Industry Criteria**

<b>Air Conditioning and Refrigeration Institute (ARI)</b>	
ARI 310/380	Packaged Terminal Air-Conditioners and Heat Pumps
ARI 440	Room Fan-Coil and Unit Ventilator
ANSI/ARI 430-99	Central Station Air Handling Units
ARI 445	Room Air-Induction Units
ARI 880	Air Terminals
<b>Air Movement and Control Association (AMCA)</b>	
AMCA 210	Laboratory Methods of Testing Fans for Rating
<b>American Architectural Manufacturers Association (AAMA)</b>	
AAMA 605	Voluntary Specification Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels
AAMA 607.1	Voluntary Guide Specifications and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum
AAMA 1503	Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors, and Glazed Wall Sections
<b>American Association of State Highway and Transportation Officials (AASHTO)</b>	
	Roadside Design Guide [guardrails, roadside safety devices]

	Standard Specifications for Transportation Materials and Methods of Sampling and Testing [Road Construction Materials]
	Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals
	Guide for Design of Pavement Structures, Volumes 1 and 2 [pavement design guide]
	A Policy of Geometric Design of Highways and Streets
<b>American Bearing Manufacturers Association (AFBMA)</b>	
AFBMA Std. 9	Load Ratings and Fatigue Life for Ball Bearings
AFBMA Std. 11	Load Ratings and Fatigue Life for Roller Bearings
<b>American Boiler Manufacturers Association (ABMA)</b>	
ABMA ISEI	Industry Standards and Engineering Information
<b>American Concrete Institute</b>	
ACI 302.2R	Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials
ACI 318	Building Code Requirements for Structural Concrete
ACI SP-66	ACI Detailing Manual
ACI 530	Building Code Requirements for Masonry Structures
<b>ADA Standards for Accessible Design</b>	
See US Access Board	ADA and ABA Accessibility Guidelines for Buildings and Facilities, Chapters 3-10.
<b>American Institute of Steel Construction (AISC)</b>	
	Manual of Steel Construction – 13 <sup>th</sup> Edition (or latest version)
<b>American Iron and Steel Institute</b>	
AISI S100	North American Specification for the Design of Cold-Formed Steel Structural Members

<b>American National Standards Institute 11 (ANSI)</b>	
ANSI Z21.10.1	Gas Water Heaters Vol. 1, Storage water Heaters with Input Ratings of 75,000 Btu per Hour or less
ANSI Z124.3	American National Standard for Plastic Lavatories
ANSI Z124.6	Plastic Sinks
ANSI Z21.45	Flexible Connectors of Other Than All-Metal Construction for Gas Appliances
ANSI/IEEE C2-2007	National Electrical Safety Code
ANSI/AF&PA NDS-2001	National Design Specification for Wood Construction
<b>American Society of Civil Engineers (ASCE)</b>	
ASCE 7	Minimum Design Loads for Buildings and Other Structures
ASCE 37	Design and Construction of Sanitary and Storm Sewers, Manuals and Reports on Engineering Practice [sanitary sewer and storm drain design criteria]
ASCE/SEI 31-03	Seismic Evaluation of Existing Buildings [Existing Building Alteration/Renovation]
ASCE/SEI 41-06	Seismic Rehabilitation of Existing Buildings [Existing Building Alteration/Renovation]
<b>American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE)</b>	
ASHRAE 90.1	ANSI/ASHRAE/IESNA 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings
ASHRAE Guideline 0	The Commissioning Process
ASHRAE Guideline 1.1	The HVAC Commissioning Process
ASHRAE Handbooks	Fundamentals, HVAC Applications, Systems and Equipment, Refrigeration (Applicable, except as otherwise specified)
ASHRAE Standard 15	Safety Standard for Refrigeration Systems
ASHRAE Standard 62.1	Ventilation for Acceptable Indoor Air Quality

ASHRAE Standard 55	Thermal Environmental Conditions for Human Occupancy (Design portion is applicable, except where precluded by other project requirements.)
<b>American Society of Mechanical Engineers International (ASME)</b>	
ASME BPVC SEC VII	Boiler and Pressure Vessel Code: Section VII Recommended Guidelines for the Care of Power Boilers
ASME A17.1	Safety Code for Elevators and Escalators
ASME B 31 (Series)	Piping Codes
<b>American Water Works Association (AWWA)</b>	
	Standards [standards for water line materials and construction]
<b>American Welding Society</b>	
	Welding Handbook
	Welding Codes and Specifications (as applicable to application, see International Building Code for example)
<b>Architectural Woodwork Institute (AWI)</b>	
Latest Version	AWI Quality Standards
<b>Associated Air Balance Council (AABC)</b>	
AABC MN-1	National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems
	AABC Associated Air Balance Council Testing and Balance Procedures
<b>ASTM International</b>	
ASTM C1060-90(1997)	Standard Practice for Thermographic Inspection of Insulation Installations in Envelope Cavities of Frame Buildings
ASTM E 779 (2003)	Standard Test Method for Determining Air Leakage Rate by Fan Pressurization
ASTM E1827-96(2002)	Standard Test Methods for Determining Airtightness of Buildings Using an Orifice Blower Door

<b>Builders Hardware Manufacturers Association (BHMA)</b>	
ANSI/BHMA	The Various BHMA American National Standards
<b>Building Industry Consulting Service International</b>	
	Telecommunications Distribution Methods Manual (TDMM)
	Customer-Owned Outside Plant Design Manual (CO-OSP)
<b>Code of Federal Regulations (CFR)</b>	
49 CFR 192	Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards
10 CFR 430	Energy Conservation Program for Consumer Products
<b>Consumer Electronics Association</b>	
CEA 709.1B	Control Network Protocol Specification
CEA 709.3	Free-Topology Twisted-Pair Channel Specification
CEA 852	Tunneling Component Network Protocols Over Internet Protocol Channels
<b>Electronic Industries Association (EIA)</b>	
ANSI/EIA/TIA 568	Structured Cabling Series
ANSI/EIA/TIA 569	Commercial Building Standard for Telecommunications Pathways and Spaces (includes ADDENDA)
ANSI/TIA/EIA-606	Administrative Standard for the Telecommunications Infrastructure of Commercial Buildings
J-STD EIA/TIA 607	Commercial Building Grounding and Bonding Requirements for Telecommunications
<b>Federal Highway Administration (FHWA)</b>	
	Manual on Uniform Traffic Control Devices for Streets and Highways [signage and pavement markings for streets and highways]
FHWA-NHI-01-021	Hydraulic Engineering Circular No. 22, Second Edition, URBAN DRAINAGE DESIGN MANUAL

<b>Illuminating Engineering Society of North America (IESNA)</b>	
IESNA RP-1	Office Lighting
IESNA RP-8	Roadway Lighting
IESNA Lighting Handbook	Reference and Application
<b>Institute of Electrical and Electronics Engineers Inc. (IEEE)</b>	
	Standard for Use of the International System of Units (SI): the Modern Metric System
Standard 1100	Recommended Practice for Powering and Grounding Sensitive Electronic Equipment
<b>International Code Council (ICC)</b>	
IBC	<p>International Building Code</p> <p>Note: All references in the International Building Code to the International Electrical Code shall be considered to be references to NFPA 70.</p> <p>All references in the International Building Code to the International Fuel Gas Code shall be considered to be references to NFPA 54 and NFPA 58.</p> <p>All references in the International Building Code to the International Fire Code and Chapter 9 shall be considered to be references to Unified Facilities Criteria (UFC) 3-600-01.</p>
IMC	<p>International Mechanical Code –</p> <p>Note: For all references to “HEATING AND COOLING LOAD CALCULATIONS”, follow ASHRAE 90.1</p> <p>Note: For all references to “VENTILATION”, follow ASHRAE 62.1</p>
IRC	International Residential Code
IPC	International Plumbing Code
IEC	Energy Conservation Code (IEC) –Applicable only to the extent specifically referenced herein. Refer to Paragraph 5, ENERGY CONSERVATION requirements.
IGC	International Gas Code - not applicable. Follow NFPA 54, National Fuel Gas Code and NFPA 58, Liquefied Petroleum Gas Code.

<b>International Organization for Standardization (ISO)</b>	
ISO 6781:1983	Qualitative detection of thermal irregularities in building envelopes – infrared method
<b>LonMark International (LonMark)</b>	
LonMark Interoperability Guidelines	(available at <a href="http://www.lonmark.org">www.lonmark.org</a> ), including: Application Layer Guidelines, Layer 1-6 Guidelines, and External Interface File (XIF) Reference Guide
LonMark Resource Files	(available at <a href="http://www.lonmark.org">www.lonmark.org</a> ), including Standard Network Variable Type (SNVT) definitions
<b>Metal Building Manufacturers Association (MBMA)</b>	
	Metal Building Systems Manual
<b>Midwest Insulation Contractors Association (MICA)</b>	
	National Commercial and Industrial Insulation Standards Manual
<b>National Association of Corrosion Engineers International (NACE)</b>	
NACE RP0169	Control of External Corrosion on Underground or Submerged Metallic Piping Systems
NACE RP0185	Extruded, Polyolefin Resin Coating Systems with Adhesives for Underground or Submerged Pipe
NACE RP0285	Corrosion Control of Underground Storage Tank Systems by Cathodic Protection
NACE RP0286	Electrical Isolation of Cathodically Protected Pipelines
<b>National Electrical Manufacturers Association (NEMA)</b>	
<b>National Environmental Balancing Bureau (NEBB)</b>	
	Procedural Standards Procedural Standards for Testing Adjusting Balancing of Environmental Systems
<b>National Fire Protection Association (NFPA)</b>	
NFPA 10	Standard for Portable Fire Extinguishers
NFPA 13	Installation of Sprinkler Systems

NFPA 13R	Residential Occupancies up to and Including Four Stories in Height Sprinkler Systems
NFPA 14	Standard for the Installation of Standpipes and Hose Systems
NFPA 20	Installation of Centrifugal Fire Pumps
NFPA 24 NFPA 25	Standard for the Installation of Private Fire Service Mains and Their Appurtenances [underground fire protection system design]  Inspection, Testing And Maintenance Of Water-Based Fire Protection Systems
NFPA 30	Flammable and Combustible Liquids Code
NFPA 30A	Motor Fuel Dispensing Facilities and Repair Garages
NFPA 31	Installation of Oil Burning Equipment
NFPA 54	National Fuel Gas Code
NFPA 58	Liquefied Petroleum Gas Code
NFPA 70	National Electrical Code
NFPA 72	National Fire Alarm Code
NFPA 76	Fire Protection of Telecommunications Facilities
NFPA 80	Standard for Fire Doors and Fire Windows
NFPA 90a	Installation of Air Conditioning and Ventilating Systems
NFPA 96	Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations
NFPA 101	Life Safety Code
NFPA 780	Standard for the Installation of Lightning Protection Systems
<b>National Roofing Contractor's Association (NRCA)</b>	
	Roofing and Waterproofing Manual
<b>National Sanitation Foundation, International</b>	



NSF/ANSI Std. 2, 3, 4, 5, 6, 7, 8, 12, 13, 18, 20, 21, 25, 29, 35, 36, 37, 51, 52, 59, 169	Food Equipment Standards
ANSI/UL Std. 73, 197, 471, 621, 763	Food Equipment Standards
CSA Std. C22.2 No. 109, 120, 195	Food Equipment Standards
<b>Occupational Safety and Health Administration (OSHA)</b>	
Title 29, Part 1926	OSHA Construction Industry Standards, Title 29, Code of Federal Regulations, Part 1926, Safety and Health Regulations for Construction
<b>Plumbing and Drainage Institute (PDI)</b>	
PDI G 101	Testing and Rating Procedure for Grease Interceptors with Appendix of Sizing and Installation Data
PDI WH201	Water Hammer Arrestors
<b>Precast Concrete Institute</b>	
PCI Design Handbook	Precast and Prestressed Concrete
<b>Sheet Metal and Air Conditioning Contractor's National Association (SMACNA)</b>	
SMACNA HVAC Duct Construction Standards	HVAC Duct Construction Standards - Metal and Flexible
SMACNA Architectural Manual	Architectural Sheet Metal Manual
SMACNA HVAC TAB	HVAC Systems - Testing, Adjusting and Balancing
<b>State/Local Regulations</b>	
	State Department of Transportation Standard Specifications for Highway and Bridge Construction
	Sedimentation and Erosion Control Design Requirements
	Environmental Control Requirements
	Storm Water Management Requirements

<b>Steel Door Institute (SDI)</b>	
ANSI A250.8/SDI 100	Standard Steel Doors and Frames
<b>Steel Deck Institute</b>	
	SDI Diaphragm Design Manual
<b>Steel Joist Institute</b>	
	Catalog of Standard Specifications and Load Tables for Steel Joists and Joist Girders
<b>Underwriters Laboratories (UL)</b>	
UL 96A	Installation Requirements for Lightning Protection Systems
UL 300	Standard for Safety for Fire Testing of Fire Extinguishing Systems for Protection of Restaurant Cooking Areas
<b>UNITED STATES ACCESS BOARD: U.S. ARCHITECTURAL AND TRANSPORTATION BARRIERS COMPLIANCE BOARD</b>	
ADA and ABA Accessibility Guidelines for Buildings and Facilities	<p>ABA Accessibility Standard for DoD Facilities</p> <p>Derived from the ADA and ABA Accessibility Guidelines: Specifically includes: ABA Chapters 1 and 2 and Chapters 3 through 10.</p> <p>Use this reference in lieu of IBC Chapter 11.</p> <p>Excluded are:</p> <p>(a) Facilities, or portions of facilities, on a military installation that are designed and constructed for use exclusively by able-bodied military personnel (See Paragraph 3 for any reference to this exclusion).</p> <p>(b) Reserve and National Guard facilities, or portions of such facilities, owned by or under the control of the Department of Defense, that are designed and constructed for use exclusively by able-bodied military personnel. (See paragraph 3 for any reference to this exclusion).</p>
<b>U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES</b>	
	FDA National Food Code
<b>U.S. GREEN BUILDING COUNCIL (USGBC)</b>	
LEED-NC	Green Building Rating System for New Construction & Major Renovations
	Application Guide for Multiple Buildings and On-Campus Building

	Projects
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#### 4.2. MILITARY CRITERIA

The project shall conform to the following criteria. Certain design impacts and features due to these criteria are noted for the benefit of the offeror. However, all requirements of the referenced criteria will be applicable, whether noted or not, unless otherwise specified herein.

4.2.1. Energy Policy Act of 2005 (Public Law 109-58) (applies only to the extent specifically implemented in the contract, which may or may not directly cite or reference EPACT)

4.2.2. Executive Order 12770: Metric Usage In Federal Government

(a) Metric design and construction is required except when it increases construction cost. Offeror to determine most cost efficient system of measurement to be used for the project.

4.2.3. TB MED 530: Occupational and Environmental Health Food Sanitation

4.2.4. Unified Facilities Criteria (UFC) 3-410-01FA: Heating, Ventilating, and Air Conditioning - applicable only to the extent specified in paragraph 5, herein.

4.2.5. Deleted.

4.2.6. UFC 3-600-01 Design: Fire Protection Engineering for Facilities. Use the latest edition of the IBC in coordination with this UFC. Use Chapters 3, 6, 7, 33 and UFC 3-600-01. If any conflict occurs between these Chapters and UFC 3-600-01, the requirements of UFC 3-600-01 take precedence. Use UFC 3-600-01 in lieu of IBC Chapters 4, 8,9,10.

4.2.7. UFC 4-010-01 DoD Minimum Antiterrorism Standards for Buildings

4.2.8. UFC 4-023-03 Design of Buildings to Resist Progressive Collapse (Use most recent version, regardless of references thereto in other publications)

(a) Note the option to use tie force method or alternate path design for Occupancy Category II.

4.2.9. UFC 4-021-01 Design and O&M: Mass Notification Systems

4.2.10. Technical Criteria for Installation Information Infrastructure Architecture (I3A)

(a) Email: [DetrickISECI3Aguide@conus.army.mil](mailto:DetrickISECI3Aguide@conus.army.mil)

4.2.11. U.S. Army Information Systems Engineering Command (USAISEC) TG for the Integration of SECRET Internet Protocol (IP) Router Network (SIPRNET). See Paragraph 3 for applicability to specific facility type. May not apply to every facility. This is mandatory criteria for those facilities with SIPRNET.

4.2.11.1. Draft Guide Specification for Section 27 05 28 PROTECTIVE DISTRIBUTION SYSTEM (PDS) FOR SIPRNET COMMUNICATIONS SYSTEMS, found at [https://rfpwizard.cecer.army.mil/HTML/docs/Refs/SECTION\\_270528-v3.pdf](https://rfpwizard.cecer.army.mil/HTML/docs/Refs/SECTION_270528-v3.pdf)

## 5.0 GENERAL TECHNICAL REQUIREMENTS

This paragraph contains technical requirements with general applicability to Army facilities. See also Paragraph 3 for facility type-specific operational, functional and technical requirements. Residential or similar grade finishes and materials are not acceptable for inclusion in these buildings, unless otherwise specifically allowed.

### 5.1. SITE PLANNING AND DESIGN

5.1.1. STANDARDS AND CODES: The site planning and design shall conform to APPLICABLE CRITERIA and to paragraph 6, PROJECT SPECIFIC REQUIREMENTS.

5.1.2. SITE PLANNING OBJECTIVES: Group buildings in configurations that create a sense of community and promote pedestrian use. See paragraph 3 for additional site planning requirements relating to building functions.

5.1.2.1. Provide enclosures and or visual screening devices for Outdoor Utility such as dumpsters, emergency generators, transformers, heating, ventilation, and air conditioning units from streetscape and courtyard views to limit visual impact. Enclosures shall be compatible with the building they serve and accessible by vehicle. The location of dumpsters can have a significant visual impact and should be addressed as part of an overall building design and incorporated in site planning.

5.1.2.2. Where included in the project, dumpster pads shall be concrete (minimum of 8 inches thick on 4 inch base course, unless site conditions dictate more conservative requirements) and directly accessible by way of a paved service drive or parking lot with adequate overhead clearance for collection vehicles. Provide space at dumpster areas for recycling receptacles. Coordinate with Installation on recycling receptacle types, sizes and access requirements and provide space at dumpster areas to accommodate them.

5.1.2.3. Vehicular Circulation. Apply design vehicle templates provided by the American Association of State Highway and Transportation Officials (AASHTO) to the site design. The passenger car class includes passenger cars and light trucks, such as vans and pick-ups. The passenger car template is equivalent to the non-organizational – privately owned vehicle (POV). The truck class template includes single-unit trucks, recreation vehicles, buses, truck tractor-semi-trailer combinations, and trucks or truck tractors with semi-trailers in combination with full trailers. Provide vehicle clearances required to meet traffic safety for emergency vehicles, service vehicles, and moving vans. Provide required traffic control signage Site entrances and site drive aisles shall maximize spacing between drives, incorporate right-angle turns, and limit points of conflict between traffic. Design Services Drives to restrict access to unauthorized vehicles by removable bollards, gates, or other barriers to meet Anti-Terrorism/Force Protection (ATFP) requirements. Orient service drives to building entrances other than the primary pedestrian entry at the front of the building.

5.1.2.4. Provide Emergency Vehicle Access around the facility and shall be in accordance with AT/FP requirements. Maintain a 33-foot clear zone buffer for emergency vehicles, designed to prevent other vehicles from entering the AT/FP standoff to the building.

5.1.2.5. Clear and grub all trees and vegetation necessary for construction; but, save as many trees as possible. Protect trees to be saved during the construction process from equipment.

5.1.2.6. Stormwater Management. Employ design and construction strategies (Best Management Practices) that reduce stormwater runoff, reduce discharges of polluted water offsite and maintain or restore predevelopment hydrology with respect to temperature, rate, volume and duration of flow to the maximum extent practicable. See paragraph 6, PROJECT SPECIFIC requirements for additional information.

5.1.3. EXTERIOR SIGNAGE: Provide exterior signage in accordance with Appendix H, Exterior Signage. Provide exterior NO SMOKING signage that conveys building and grounds smoking policy.

5.1.4. EXISTING UTILITIES: Base utilities maps and capacities for this site are included as part of this RFP. See paragraph 6 for more detailed information.

### 5.2. SITE ENGINEERING

5.2.1. STANDARDS AND CODES: The site engineering shall conform to APPLICABLE CRITERIA.

5.2.2. SOILS:

5.2.2.1. A report has been prepared to characterize the subsurface conditions at the project site and is **appended to these specifications**. The report provides a general overview of the soil and geologic conditions with detailed descriptions at discrete boring locations. The Contractor's team shall include a licensed geotechnical engineer to interpret the report and develop earthwork and foundation recommendations and design parameters in which to base the contractor's design. If any additional subsurface investigation or laboratory analysis is required to better characterize the site or develop the final design, the Contractor shall perform it under the direction of a licensed geotechnical engineer. There will be no separate payment for the cost of additional tests. If differences between the Contractor's additional subsurface investigation and the government provided soils report or the reasonably expected conditions require material revisions in the design, an equitable adjustment may be made, in accordance with the provisions of the Differing Site Conditions clause. The basis for the adjustment would be the design and construction appropriate for the conditions described in the Government furnished report or the reasonably expected conditions, in comparison with any changes required by material differences in the actual conditions encountered, in accordance with the terms of contract clause Differing Site Conditions.

5.2.2.2. The contractor's licensed geotechnical engineer shall prepare a final geotechnical evaluation report, to be submitted along with the first foundation design submittal, as described in Section 01 33 16, *Design After Award*.

5.2.3. VEHICLE PAVEMENTS: (as applicable to the project)

5.2.3.1. Design procedures and materials shall conform to one of the following: 1) the USACE Pavement Transportation Computer Assisted Structural Engineering (PCASE) program, 2) American Association of State Highway and Transportation Officials (AASHTO) or, 3) the applicable state Department of Transportation standards in which the project is located. See paragraph 5.2.2.2 and Section 01 33 16 for required information for the Contractor's geotechnical evaluation report. The minimum flexible pavement section shall consist of 2 inches of asphalt and 6 inches of base or as required by the pavement design, whichever is greater, unless specifically identified by the Government to be a gravel road. Design roads and parking areas for a life expectancy of 25 years with normal maintenance. Parking area for tactical vehicles (as applicable to the project) shall be Portland Cement Concrete (PCC) rigid pavement design. For concrete pavements, submit joint layout plan for review and concurrence. Design pavements for military tracked vehicles (as applicable to the project) IAW USACE PCASE. Traffic estimates for each roadway area will be as shown on the drawings or listed in Section 01 10 00 Paragraph 6.4.4. Pavement markings and traffic signage shall comply with the Installation requirements and with the Manual on Uniform Traffic Control Devices.

5.2.3.2. Parking Requirements.

(a) All handicap POV parking lots (where applicable in the facility specific requirements) shall meet the ADA and ABA Accessibility Guidelines for accessible parking spaces.

(b) Design POV parking spaces for the type of vehicles anticipated, but shall be a minimum of 9 ft by 18 ft for POVs, except for two wheel vehicles.

5.2.3.3. Sidewalks. Design the network of walks throughout the complex (where applicable) to facilitate pedestrian traffic among facilities, and minimize the need to use vehicles. Incorporate sidewalks to enhance the appearance of the site development, while creating a sense of entry at the primary patron entrances to the buildings. Minimum sidewalk requirements are in Paragraph 3, where applicable and/or paragraph 6 and/or site plans, where applicable..

5.2.4. CATHODIC PROTECTION: Provide cathodic protection systems for all underground metallic systems and metallic fittings/portions of non-metallic, underground systems, both inside and outside the building 5 foot line that are subject to corrosion. Coordinate final solutions with the installation to insure an approach that is consistent with installation cathodic protection programs.

5.2.5. UTILITIES: See paragraph 6.4.6 for specific information on ownership of utilities and utility requirements. Meter all utilities (gas, water, and electric, as applicable) to each facility. For Government owned utilities, install meters that are wireless data transmission capable as well as have a continuous manual reading option. All meters will be capable of at least hourly data logging and transmission and provide consumption data for gas, water, and

electricity. Gas and electric meters will also provide demand readings based on consumption over a maximum of any 15 minute period. Configure all meters to transmit at least daily even if no receiver for the data is currently available at the time of project acceptance. For privatized utilities, coordinate with the privatization utility(ies) for the proper meter base and meter installation.

5.2.6. PERMITS: The CONTRACTOR shall be responsible for obtaining all permits (local, state and federal) required for design and construction of all site features and utilities.

5.2.7. IRRIGATION. Landscape irrigation systems, if provided, shall comply with the following:

5.2.7.1. Irrigation Potable Water Use Reduction. Reduce irrigation potable water use by 100 percent using LEED credit WE1.1 baseline (no potable water used for irrigation), except where precluded by other project requirements.

5.2.8. EPA WATERSENSE PRODUCTS AND CONTRACTORS. Except where precluded by other project requirements, use EPA WaterSense labeled products and irrigation contractors that are certified through a WaterSense labeled program where available.

### 5.3. ARCHITECTURE AND INTERIOR DESIGN:

This element will be evaluated per APPLICABLE CRITERIA under the quality focus.

5.3.1. STANDARDS AND CODES: The architecture and interior design shall conform to APPLICABLE CRITERIA.

5.3.2. GENERAL: Overall architectural goal is to provide a functional, quality, visually appealing facility that is a source of pride for the installation and delivered within the available budget and schedule.

5.3.3. COMPUTATION OF AREAS: See APPENDIX Q for how to compute gross and net areas of the facility(ies).

5.3.4. BUILDING EXTERIOR: Design buildings to enhance or compliment the visual environment of the Installation. Where appropriate, reflect a human scale to the facility. Building entrance should be architecturally defined and easily seen. When practical, exterior materials, roof forms, and detailing shall be compatible with the surrounding development and adjacent buildings on the Installation and follow locally established architectural themes. Use durable materials that are easy to maintain. Exterior colors shall conform to the Installation requirements. See paragraph 6.

5.3.4.1. Building Numbers: Permanently attach exterior signage on two faces of each building indicating the assigned building number or address. Building number signage details and locations shall conform to Appendix H, Exterior Signage.

### 5.3.5. BUILDING INTERIOR

5.3.5.1. Space Configuration: Arrange spaces in an efficient and functional manner in accordance with area adjacency matrices.

5.3.5.2. Surfaces: Appearance retention is the top priority for building and furniture related finishes. Provide low maintenance, easily cleaned room finishes that are commercially standard for the facility occupancy specified, unless noted otherwise.

5.3.5.3. Color: The color, texture and pattern selections for the finishes of the building shall provide an aesthetically pleasing, comfortable, easily maintainable and functional environment for the occupants. Coordinate the building colors and finishes for a cohesive design. Select colors appropriate for the building type. Use color, texture and pattern to path or way find through the building. Trendy colors that will become dated shall be limited to non-permanent finishes such as carpet and paint. Select finishes with regards to aesthetics, maintenance, durability, life safety and image. Limit the number of similar colors for each material. Use medium range colors for ceramic and porcelain tile grout to help hide soiling. Plastic laminate and solid surface materials shall have patterns that are mottled, flecked or speckled. Coordinate finish colors of fire extinguisher cabinets, receptacle bodies and plates, fire alarms / warning lights, emergency lighting, and other miscellaneous items with the building interior. Match color of equipment items on ceilings (speakers, smoke detectors, grills, etc.) the ceiling color.

5.3.5.4. Circulation: Circulation schemes must support easy way finding within the building.

5.3.5.5. Signage: Provide interior signage for overall way finding and life safety requirements. A comprehensive interior plan shall be from one manufacturer. Include the following sign types: (1) Lobby Directory, (2) Directional Signs; (3) Room Identification Signs; (4) Building Service Signs; (5) Regulatory Signs; (6) Official and Unofficial Signs (7) Visual Communication Boards (8) NO SMOKING signage that conveys building smoking policy. Use of emblems or logos may also be incorporated into the signage plan.

5.3.5.6. Window Treatment: Provide interior window treatments with adjustable control in all exterior window locations for control of day light coming in windows or privacy at night. Maintain uniformity of treatment color and material to the maximum extent possible within a building.

5.3.5.7. Casework: Unless, otherwise specified, all casework for Cabinetry and cases shall be "custom grade", as described in the AWI Quality Standards.

#### 5.3.6. COMPREHENSIVE INTERIOR DESIGN

5.3.6.1. Comprehensive Interior Design includes the integration of a Structural Interior Design (SID) and a Furniture, Fixtures and Equipment (FF&E) design and package. SID requires the design, selection and coordination of interior finish materials that are integral to or attached to the building structure. Completion of a SID involves the selection and specification of applied finishes for the building's interior features including, but not limited to, walls, floors, ceilings, trims, doors, windows, window treatments, built-in furnishings and installed equipment, lighting, and signage. The SID package includes finish schedules, finish samples and any supporting interior elevations, details or plans necessary to communicate the building finish design and build out. The SID also provides basic space planning for the anticipated FF&E requirements in conjunction with the functional layout of the building and design issues such as life safety, privacy, acoustics, lighting, ventilation, and accessibility. See Section 01 33 16 for SID design procedures.

5.3.6.2. The FF&E design and package includes the design, selection, color coordination and of the required furnishing items necessary to meet the functional, operational, sustainability, and aesthetic needs of the facility coordinated with the interior finish materials in the SID. The FF&E package includes the specification, procurement documentation, placement plans, ordering and finish information on all freestanding furnishings and accessories, and a cost estimate. Coordinate the selection of furniture style, function and configuration with the defined requirements. Examples of FF&E items include, but are not limited to workstations, seating, files, tables, beds, wardrobes, draperies and accessories as well as marker boards, tack boards, and presentation screens. Criteria for furniture selection include function and ergonomics, maintenance, durability, sustainability, comfort and cost. See Section 01 33 16 for FFE design procedures.

#### 5.4. STRUCTURAL DESIGN

5.4.1. STANDARDS AND CODES: The structural design shall conform to APPLICABLE CRITERIA.

5.4.2. GENERAL: The structural system must be compatible with the intended functions and components that allows for future flexibility and reconfigurations of the interior space. Do not locate columns, for instance, in rooms requiring visibility, circulation or open space, including, but not limited to entries, hallways, common areas, classrooms, etc. Select an economical structural system based upon facility size, projected load requirements and local availability of materials and labor. Base the structural design on accurate, site specific geotechnical information and anticipated loads for the building types and geographical location. Consider climate conditions, high humidity, industrial atmosphere, saltwater exposure, or other adverse conditions when selecting the type of cement and admixtures used in concrete, the concrete cover on reinforcing steel, the coatings on structural members, expansion joints, the level of corrosion protection, and the structural systems. Analyze, design and detail each building as a complete structural system. Design structural elements to preclude damage to finishes, partitions and other frangible, non-structural elements to prevent impaired operability of moveable components; and to prevent cladding leakage and roof ponding. Limit deflections of structural members to the allowable of the applicable material standard, e.g., ACI, AISC, Brick Industry Association, etc. When modular units or other pre-fabricated construction is used or combined with stick-built construction, fully coordinate and integrate the overall structural design between the two different or interfacing construction types. If the state that the project is located in requires separate, specific licensing for structural engineers (for instance, such as in Florida, California and others), then the structural engineer designer of record must be registered in that state.

5.4.3. LOADS: See paragraph 3 for facility specific (if applicable) and paragraph 6 for site and project specific structural loading criteria. Unless otherwise specified in paragraph 6, use Exposure Category C for wind. If not specified, use Category C unless the Designer of Record can satisfactorily justify another Exposure Category in its design analysis based on the facility Master Plan. Submit such exceptions for approval as early as possible and prior to the Interim Design Submittal in Section "Design After Award". Design the ancillary building items, e.g. doors, window jambs and connections, overhead architectural features, systems and equipment bracing, ducting, piping, etc. for gravity, seismic, lateral loads and for the requirements of UFC 4-010-01, DOD Minimum Antiterrorism Standards for Buildings. Ensure and document that the design of glazed items includes, but is not limited to, the following items under the design loads prescribed in UFC 4-010-01:

- (a) Supporting members of glazed elements, e.g. window jamb, sill, header
- (b) Connections of glazed element to supporting members, e.g. window to header
- (c) Connections of supporting members to each other, e.g. header to jamb
- (d) Connections of supporting members to structural system, e.g. jamb to foundation.

5.4.4. TERMITE TREATMENT: (Except Alaska) Provide termite prevention treatment in accordance with Installation and local building code requirements, using licensed chemicals and licensed applicator firm.

## 5.5. THERMAL PERFORMANCE

5.5.1. STANDARDS AND CODES: Building construction and thermal insulation for mechanical systems shall conform to APPLICABLE CRITERIA.

5.5.2. BUILDING ENVELOPE SEALING PERFORMANCE REQUIREMENT. Design and construct the building envelope for office buildings, office portions of mixed office and open space (e.g., company operations facilities), dining, barracks and instructional/training facilities with a continuous air barrier to control air leakage into, or out of, the conditioned space. Clearly identify all air barrier components of each envelope assembly on construction documents and detail the joints, interconnections and penetrations of the air barrier components. Clearly identify the boundary limits of the building air barriers, and of the zone or zones to be tested for building air tightness on the drawings. Pending the publication of the 2010 version of ASHRAE 90.1, the use of painted interior walls is not an acceptable air barrier method.

5.5.2.1. Trace a continuous plane of air-tightness throughout the building envelope and make flexible and seal all moving joints.

5.5.2.2. The air barrier material(s) must have an air permeance not to exceed 0.004 cfm / sf at 0.3" wg (0.02 L/s.m2 @ 75 Pa) when tested in accordance with ASTM E 2178

5.5.2.3. Join and seal the air barrier material of each assembly in a flexible manner to the air barrier material of adjacent assemblies, allowing for the relative movement of these assemblies and components.

5.5.2.4. Support the air barrier so as to withstand the maximum positive and negative air pressure to be placed on the building without displacement, or damage, and transfer the load to the structure.

5.5.2.5. Seal all penetrations of the air barrier. If any unavoidable penetrations of the air barrier by electrical boxes, plumbing fixture boxes, and other assemblies are not airtight, make them airtight by sealing the assembly and the interface between the assembly and the air barrier or by extending the air barrier over the assembly.

5.5.2.6. The air barrier must be durable to last the anticipated service life of the assembly.

5.5.2.7. Do not install lighting fixtures with ventilation holes through the air barrier

5.5.2.8. Provide a motorized damper in the closed position and connected to the fire alarm system to open on call and fail in the open position for any fixed open louvers such as at elevator shafts.

5.5.2.9. Damper and control to close all ventilation or make-up air intakes and exhausts, atrium smoke exhausts and intakes, etc when leakage can occur during inactive periods.



- 5.5.2.10. Compartmentalize garages under buildings by providing air-tight vestibules at building access points.
- 5.5.2.11. Compartmentalize spaces under negative pressure such as boiler rooms and provide make-up air for combustion.
- 5.5.2.12. Performance Criteria and Substantiation: Submit the qualifications and experience of the testing entity for approval. Demonstrate performance of the continuous air barrier for the opaque building envelope by the following tests:
- (a) Develop an Air Barrier Quality Assurance plan to assure that a competent air barrier inspector/specialist inspects the critical components prior to them being concealed. At a minimum, three onsite inspections are required during construction to assure the completeness of the construction and design.
  - (b) Test the completed building and demonstrate that the air leakage rate of the building envelope does not exceed 0.25cfm/ft<sup>2</sup> at a pressure differential of 0.3" w.g.(75 Pa) in accordance with ASTM's E 779 (2003) or E-1827-96 (2002). Accomplish tests using either pressurization or depressurization or both. Divide the volume of air leakage in cfm @ 0.3" w.g. (L/s @ 75 Pa) by the area of the pressure boundary of the building, including roof or ceiling, walls and floor to produce the air leakage rate in cfm/ft<sup>2</sup> @ 0.3" w.g. (L/s.m<sup>2</sup> @ 75 Pa). Do not test the building until verifying that the continuous air barrier is in place and installed without failures in accordance with installation instructions so that repairs to the continuous air barrier, if needed to comply with the required air leakage rate, can be done in a timely manner.
  - (c) Test the completed building using Infrared Thermography testing. Use infrared cameras with a resolution of 0.1deg C or better. Perform testing on the building envelope in accordance with ISO 6781:1983 and ASTM C1060-90(1997). Determine air leakage pathways using ASTM E 1186-03 Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems, and perform corrective work as necessary to achieve the whole building air leakage rate specified in (a) above.
  - (d) Notify the Government at least three working days prior to the tests to provide the Government the opportunity to witness the tests. Provide the Government written test results confirming the results of all tests.

## 5.6. PLUMBING

5.6.1. STANDARDS AND CODES: The plumbing system shall conform to APPLICABLE CRITERIA.

5.6.2. PRECAUTIONS FOR EXPANSIVE SOILS: Where expansive soils are present, include design features for underslab piping systems and underground piping serving chillers, cooling towers, etc, to control forces resulting from soil heave. Some possible solutions include, but are not necessarily limited to, features such as flexible expansion joints, slip joints, horizontal offsets with ball joints, or multiple bell and spigot gasketed fittings. For structurally supported slabs, suspend piping from the structure with adequate space provided below the pipe for the anticipated soil movement.

5.6.3. HOT WATER SYSTEMS: For Hot Water heating and supply, provide a minimum temp of 140 Deg F in the storage tank and a maximum of 110 Deg F at the fixture, unless specific appliances or equipment specifically require higher temperature water supply.

5.6.4. SIZING HOT WATER SYSTEMS: Unless otherwise specified or directed in paragraph 3, design in accordance with ASHRAE Handbook Series (appropriate Chapters), ASHRAE Standard 90.1, and the energy conservation requirements of the contract. Size and place equipment so that it is easily accessible and removable for repair or replacement.

5.6.5. JANITOR CLOSETS: In janitor spaces/room/closets, provide at minimum, a service sink with heavy duty shelf and wall hung mop and broom rack(s).

5.6.6. FLOOR DRAINS: As a minimum, provide floor drains in mechanical rooms and areas, janitor spaces/rooms/closets and any other area that requires drainage from fixtures or equipment, drain downs, condensate, as necessary.

5.6.7. URINALS: Urinals shall be vitreous china, wall-mounted, wall outlet, non-water using, with integral drain line connection, and with sealed replaceable cartridge or integral liquid seal trap. Either type shall use a

biodegradable liquid to provide the seal and maintain a sanitary and odor-free environment. Install, test and maintain in accordance with manufacturer's recommendations. Slope the sanitary sewer branch line for non-water use urinals a minimum of 1/4 inch per foot. Do not use copper tube or pipe for drain lines that connect to the urinal. Manufacturer shall provide an operating manual and on-site training to installation operations personnel for the proper care and maintenance of the urinal. For complexes, non-water using urinals are not required for barracks type spaces.

5.6.8. BUILDING WATER USE REDUCTION. Reduce building potable water use in each building 30 percent using IPC fixture performance requirements baseline.

5.6.9. Do not use engineered vent or Sovent® type drainage systems.

5.6.10. Where the seasonal design temperature of the cold water entering a building is below the seasonal design dew point of the indoor ambient air, and where condensate drip will cause damage or create a hazard, insulate plumbing piping with a vapor barrier type of insulation to prevent condensation. Do not locate water or drainage piping over electrical wiring or equipment unless adequate protection against water (including condensation) damage is provided. Insulation alone is not adequate protection against condensation. Follow ASHRAE Fundamentals Chapter 23, Insulation for Mechanical Systems, IMC paragraph 1107 and International Energy Conservation Code for pipe insulation requirements.

5.6.11. Cover all drain, waste and vent piping to prevent mortar or other debris from being flushed down and blocking pipes during such construction activities.

## 5.7. ELECTRICAL AND TELECOMMUNICATIONS SYSTEMS

5.7.1. STANDARDS AND CODES: The electrical systems for all facilities shall conform to APPLICABLE CRITERIA.

5.7.2. MATERIALS AND EQUIPMENT: Materials, equipment and devices shall, as a minimum, meet the requirements of Underwriters Laboratories (UL) where UL standards are established for those items. Wiring for branch circuits shall be copper. Motors larger than one-half horsepower shall be three phase. All electrical systems shall be pre-wired and fully operational unless otherwise indicated. Wall mounted electrical devices (power receptacles, communication outlets and CATV outlets) shall have matching colors, mounting heights and faceplates.

5.7.3. POWER SERVICE: Primary service from the base electrical distribution system to the pad-mounted transformer and secondary service from the transformer to the building service electrical equipment room shall be underground. See paragraph 6 for additional site electrical requirements.

5.7.3.1. Spare Capacity: Provide 10% space for future circuit breakers in all panelboards serving residential areas of buildings and 15% spaces in all other panelboards.

5.7.4. TELECOMMUNICATION SERVICE: Connect the project's facilities to the Installation telecommunications (voice and data) system through the outside plant (OSP) telecommunications underground infrastructure cabling system per the I3A Criteria. Connect to the OSP cabling system from each facility main cross connect located in the telecommunications room.

5.7.5. LIGHTING: Comply with the recommendations of the Illumination Engineering Society of North America (IESNA), the National Energy Policy Act and Energy Star requirements for lighting products..

### 5.7.5.1. Interior Lighting:

(a) Reflective Surfaces: Coordinate interior architectural space surfaces and colors with the lighting systems to provide the most energy-efficient workable combinations.

(b) High Efficiency Fluorescent Lighting: Utilize NEMA premium electronic ballasts and energy efficient fluorescent lamps with a Correlated Color Temperature (CCT) of 4100K. Linear fluorescent and compact fluorescent fixtures shall have a Color Rendering Index of (CRI) of 87 or higher. Fluorescent lamps shall be the low mercury type qualifying as non-hazardous waste upon disposal. Do not use surface mounted fixtures on acoustical

tile ceilings. Provide an un-switched fixture with emergency ballast shall be provided at each entrance to the building.

(c) Solid State Lighting: Fixtures shall provide lighting with a minimum Correlated Color Temperature (CCT) of 4100K and shall have a Color Rendering Index of (CRI) of 75 or higher. Verify performance of the light producing solid state components by a test report in compliance with the requirements of IESNA LM 80. Verify performance of the solid state light fixtures by a test report in compliance with the requirements of IESNA LM 79. Provide lab results by a NVLAP certified laboratory. The light producing solid state components and drivers shall have a life expectancy of 50,000 operating hours while maintaining at least 70% of original illumination level. Provide a complete five year warranty for fixtures.

(d) Metal Halide Lighting (where applicable): Metal Halide lamp fixtures in the range of 150-500 Watts shall be pulse start type and have a minimum efficiency rating of 88%.

(e) Lighting Controls: ANSI/ASHRAE/IESNA 90.1 has specific lighting controls requirements. Provide a high level of lighting system control by individual occupants or by specific groups in multi-occupant spaces (classrooms, conference rooms) to promote the productivity, comfort and well being of the building occupants. In office spaces, the preferred lighting should be a 30 FC ambient lighting level with occupancy sensor controlled task lighting in the work spaces to provide a composite lighting level of 50 FC on the working surfaces. Consider incorporating daylighting techniques for the benefit of reducing lighting energy requirements while improving the quality of the indoor spaces. If daylight strategies are used, additional coordination is required with the architect and mechanical engineer. Additionally, incorporate electric lighting controls to take advantage of the potential energy savings.

(f) Exterior Lighting: See paragraph 6.9 for site specific information, if any, on exterior lighting systems. Minimize light pollution and light trespass by not over lighting and use cut-off type exterior luminaries.

5.7.6. TELECOMMUNICATION SYSTEM: Building telecommunications cabling systems (BCS) and OSP telecommunications cabling system shall conform to APPLICABLE CRITERIA, including but not limited to I3A Technical Criteria. An acceptable BCS encompasses, but is not limited to, copper and fiber optic (FO) entrance cable, termination equipment, copper and fiber backbone cable, copper and fiber horizontal distribution cable, workstation outlets, racks, cable management, patch panels, cable tray, cable ladder, conduits, grounding, and labeling.. Items included under OSP infrastructure encompass, but are not limited to, manhole and duct infrastructure, copper cable, fiber optic cable, cross connects, terminations, cable vaults, and copper and FO entrance cable.

5.7.6.1. Design, install, label and test all telecommunications systems in accordance with the I3A Criteria and ANSI/TIA/EIA 568, 569, and 606 standards. A Building Industry Consulting Services International (BICSI) Registered Communications Distribution Designer (RCDD) with at least 2 yrs related experience shall develop and stamp telecommunications design, and prepare the test plan. See paragraph 5.8.2.5 for design of environmental systems for Telecommunications Rooms.

5.7.6.2. The installers assigned to the installation of the telecommunications system or any of its components shall be regularly and professionally engaged in the business of the application, installation and testing of the specified telecommunications systems and equipment. Key personnel; i.e., supervisors and lead installers assigned to the installation of this system or any of its components shall be BICSI Registered Cabling Installers, Technician Level. Submit documentation of current BICSI certification for each of the key personnel. In lieu of BICSI certification, supervisors and installers shall have a minimum of 5 years experience in the installation of the specified copper and fiber optic cable and components. They shall have factory or factory approved certification from each equipment manufacturer indicating that they are qualified to install and test the provided products.

5.7.6.3. Perform a comprehensive end to end test of all circuits to include all copper and fiber optic cables upon completion of the BCS and prior to acceptance of the facility. Provide adequate advanced notification to the COR to allow COR and Installation personnel attendance. The BCS circuits include but are not limited to all copper and fiber optic(FO) entrance cables, termination equipment, copper and fiber backbone cable, copper and fiber horizontal distribution cable, and workstation outlets. Test in accordance with ANSI/EIA/TIA 568 standards. Use test instrumentation that meets or exceeds the standard. Submit the official test report to include test procedures, parameters tested, values, discrepancies and corrective actions in electronic format. Test and accomplish all necessary corrective actions to ensure that the government receives a fully operational, standards based, code compliant telecommunications system.

5.7.7. LIGHTNING PROTECTION SYSTEM: Provide a lightning protection system where recommended by the Lightning Risk Assessment of NFPA 780, Annex L.

5.8. HEATING, VENTILATING, AND AIR CONDITIONING

5.8.1. STANDARDS AND CODES: The HVAC system shall conform to APPLICABLE CRITERIA.

5.8.2. DESIGN CONDITIONS.

5.8.2.1. Outdoor and indoor design conditions shall be in accordance with UFC 3-410-01FA. Outdoor air and exhaust ventilation requirements for indoor air quality shall be in accordance with ASHRAE 62.1. All Buildings with minimum LEED Silver requirement (or better) will earn LEED Credit EQ 7.1, Thermal Comfort-Design., except where precluded by other project requirements. Where the contract specifies indoor design temperature , airflow, humidity conditions, etc., use those parameters.

5.8.2.2. High Humidity Areas: Design HVAC systems in geographical areas meeting the definition for high humidity in UFC 3-410-01FA to comply with the special criteria therein for humid areas.

5.8.2.3. Cooling equipment may be oversized by up to 15 percent to account for recovery from night setback. Heating equipment may be oversized by up to 30 percent to account for recovery from night setback. Design single zone systems and multi-zone systems to maintain an indoor design condition of 50% relative humidity for cooling only. For heating only where the indoor relative humidity is expected to fall below 20% for extended periods, add humidification to increase the indoor relative humidity to 30%. Provide ventilation air from a separate dedicated air handling unit (DOAU) for facilities using multiple single zone fan-coil type HVAC systems. Do not condition outside air through fan coil units. Avoid the use of direct expansion cooling coils in air handling units with constant running fans that handle outside air.

5.8.2.4. Locate all equipment so that service, adjustment and replacement of controls or internal components are readily accessible for easy maintenance.

5.8.2.5. Environmental Requirements for Telecommunications Rooms,(including SIPRNET ROOMS, where applicable for specific facility type). Comply with ANSI/EIA/TIA 569 and the I3A.

5.8.2.6. Fire dampers: dynamic type with a dynamic rating suitable for the maximum air velocity and pressure differential to which the damper is subjected. Test each fire damper with the air handling and distribution system running.

5.8.3. BUILDING AUTOMATION SYSTEM. Provide a Building Automation System consisting of a building control network , and integrate the building control network into the UMCS as specified.

The building control network shall be a single complete non-proprietary Direct Digital Control (DDC) system for control of the heating, ventilating and air conditioning (HVAC) systems as specified herein. The building control network shall be an Open implementation of LONWORKS® technology using ANSI/EIA 709.1B as the only communications protocol and use only LonMark Standard Network Variable Types (SNVTs), as defined in the LonMark® Resource Files, for communication between DDC Hardware devices to allow multi-vendor interoperability.

5.8.3.1. The building automation system shall be open in that it is designed and installed such that the Government or its agents are able to perform repair, replacement, upgrades, and expansions of the system without further dependence on the original Contractor. This includes, but is not limited to the following:

(a) Install hardware such that individual control equipment can be replaced by similar control equipment from other equipment manufacturers with no loss of system functionality.

(b) Necessary documentation (including rights to documentation and data), configuration information, configuration tools, programs, drivers, and other software shall be licensed to and otherwise remain with the Government such that the Government or its agents are able to perform repair, replacement, upgrades, and expansions of the system without subsequent or future dependence on the Contractor.

5.8.3.2. All DDC Hardware shall:

- (a) Be connected to a TP/FT-10 ANSI/EIA 709.3 control network.
- (b) Communicate over the control network via ANSI/EIA 709.1B exclusively.
- (c) Communicate with other DDC hardware using only SNVTs
- (d) Conform to the LonMark® Interoperability Guidelines.
- (e) Be locally powered; link power (over the control network) is not acceptable.
- (f) Be fully configurable via standard or user-defined configuration parameter types (SCPT or UCPT), standard network variable type (SNVT) network configuration inputs (*nci*), or hardware settings on the controller itself to support the application. All settings and parameters used by the application shall be configurable via standard or user-defined configuration parameter types (SCPT or UCPT), standard network variable type (SNVT) network configuration inputs (*nci*), or hardware settings on the controller itself
- (g) Provide input and output SNVTs required to support monitoring and control (including but not limited to scheduling, alarming, trending and overrides) of the application. Required SNVTs include but are not limited to: SNVT outputs for all hardware I/O, SNVT outputs for all setpoints and SNVT inputs for override of setpoints.
- (h) To the greatest extent practical, not rely on the control network to perform the application..

5.8.3.3. Controllers shall be Application Specific Controllers whenever an ASC suitable for the application exists. When an ASC suitable for the application does not exist use programmable controllers or multiple application specific controllers.

5.8.3.4. Application Specific Controllers shall be LonMark Certified whenever a LonMark Certified ASC suitable for the application exists. For example, VAV controllers must be LonMark certified.

5.8.3.5. Application Specific Controllers (ASCs) shall be configurable via an LNS plug-in whenever t an ASC with an LNS plug-in suitable for the application exists.

5.8.3.6. Each scheduled system shall accept a network variable of type SNVT\_occupancy and shall use this network variable to determine the occupancy mode. If the system has not received a value to this network variable for more than 60 minutes it shall default to a configured occupancy schedule.

5.8.3.7. Gateways may be used provided that each gateway communicates with and performs protocol translation for control hardware controlling one and only one package unit.

5.8.3.8. Not Used

5.8.3.9. Perform all necessary actions needed to fully integrate the building control system. These actions include but are not limited to:

- Configure M&C Software functionality including: graphical pages for System Graphic Displays including overrides, alarm handling, scheduling, trends for critical values needing long-term or permanent monitoring via trends, and demand limiting.
- Install IP routers or ANSI/CEA-852 routers as needed to connect the building control network to the UMCS IP network. Routers shall be capable of configuration via DHCP and use of an ANSI/CEA-852 configuration server but shall not rely on these services for configuration. All communication between the UMCS and building networks shall be via the ANSI/CEA-709.1B protocol over the IP network in accordance with ANSI/CEA-852.

5.8.3.10. Provide the following to the Government for review prior to acceptance of the system:

- The latest version of all software and user manuals required to program, configure and operate the system.
- Points Schedule drawing that shows every DDC Hardware device. The Points Schedule shall contain the following information as a minimum:
  - Device address and NodeID.
  - Input and Output SNVTs including SNVT Name, Type and Description.
  - Hardware I/O, including Type (AI, AO, BI, BO) and Description.
  - Alarm information including alarm limits and SNVT information.
  - Supervisory control information including SNVTs for trending and overrides.
  - Configuration parameters (for devices without LNS plug-ins) Example Points Schedules are available at <https://eko.usace.army.mil/fa/besc/>

- Riser diagram of the network showing all network cabling and hardware. Label hardware with ANSI.CEA-709.1 addresses, IP addresses, and network names.
- Control System Schematic diagram and Sequence of Operation for each HVAC system.
- Operation and Maintenance Instructions including procedures for system start-up, operation and shut-down, a routine maintenance checklist, and a qualified service organization list.
- LONWORKS® Network Services (LNS®) database for the completed system.
- Quality Control (QC) checklist (below) completed by the Contractor's Chief Quality Control (QC) Representative

**Table 5-1: QC Checklist**

5.8.3.11. Perform a Performance Verification Test (PVT) under Government supervision prior to system acceptance. During the PVT demonstrate that the system performs as specified, including but not limited to demonstrating that the system is Open and correctly performs the Sequences of Operation.

5.8.3.12. Provide a 1 year unconditional warranty on the installed system and on all service call work. The warranty shall include labor and material necessary to restore the equipment involved in the initial service call to a fully operable condition.

5.8.3.13. Provide training at the project site on the installed building system. Upon completion of this training each student, using appropriate documentation, should be able to start the system, operate the system, recover the system after a failure, perform routine maintenance and describe the specific hardware, architecture and operation of the system.

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5.8.4. TESTING, ADJUSTING AND BALANCING. Test and balance air and hydronic systems, using a firm certified for testing and balancing by the Associated Air Balance Council (AABC), National Environmental Balancing Bureau (NEBB), or the Testing Adjusting, and Balancing Bureau (TABB). The prime contractor shall hire the TAB firm directly, not through a subcontractor. Perform TAB in accordance with the requirements of the standard under which the TAB Firm's qualifications are approved, i.e., AABC MN-1, NEBB TABES, or SMACNA HVACTAB unless otherwise specified herein. All recommendations and suggested practices contained in the TAB Standard shall be considered mandatory. Use the provisions of the TAB Standard, including checklists, report forms, etc., as nearly as practicable to satisfy the Contract requirements. Use the TAB Standard for all aspects of TAB, including qualifications for the TAB Firm and Specialist and calibration of TAB instruments. Where the instrument manufacturer calibration recommendations are more stringent than those listed in the TAB Standard, adhere to the manufacturer's recommendations. All quality assurance provisions of the TAB Standard such as performance guarantees shall be part of this contract. For systems or system components not covered in the TAB Standard, the TAB Specialist shall develop TAB procedures. Where new procedures, requirements, etc., applicable to the Contract requirements have been published or adopted by the body responsible for the TAB Standard used (AABC, NEBB, or TABB), the requirements and recommendations contained in these procedures and requirements are mandatory.

5.8.5. COMMISSIONING: Commission all HVAC systems and equipment, including controls, and all systems requiring commissioning for LEED Enhanced commissioning, in accordance with ASHRAE Guideline 1.1, ASHRAE Guideline 0 and LEED. Do not use the sampling techniques discussed in ASHRAE Guideline 1.1 and in ASHRAE Guideline 0. Commission 100% of the HVAC controls and equipment. Hire the Commissioning Authority (CA), certified as a CA by AABC, NEBB, or TABB, as described in Guideline 1.1. The CA will be an independent subcontractor and not an employee of the Contractor nor an employee or subcontractor of any other subcontractor on this project, including the design professionals (i.e., the DOR or their firm(s)). The CA will communicate and report directly to the Government in execution of commissioning activities. The Contracting Officer's Representative will act as the Owner's representative in performance of duties spelled out under OWNER in Annex F of ASHRAE Guideline 0. All buildings with Minimum LEED Silver (or better) requirement will earn LEED Credit EA3 Enhanced Commissioning.

## 5.9. ENERGY CONSERVATION

5.9.1. The building including the building envelope, HVAC systems, service water heating, power, and lighting systems shall meet the Mandatory Provisions and the Prescriptive Path requirements of ASHRAE 90.1. Substantiation requirements are defined in Section 01 33 16, Design After Award.

5.9.2. Design all building systems and elements to meet the minimum requirements of ANSI/ASHRAE/IESNA 90.1. Design the buildings, including the building envelope, HVAC systems, service water heating, power, and lighting systems to achieve an energy consumption that is at least 40% below the consumption of a baseline building meeting the minimum requirements of ANSI/ASHRAE/IESNA Standard 90.1. Energy calculation methodologies and substantiation requirements are defined in Section 01 33 16, Design After Award.

5.9.3. Purchase Energy Star products, except use FEMP designated products where FEMP is applicable to the type product. The term "Energy Star product" means a product that is rated for energy efficiency under an Energy Star program. The term "FEMP designated product" means a product that is designated under the Federal Energy Management Program of the Department of Energy as being among the highest 25 percent of equivalent products for energy efficiency. When selecting integral sized electric motors, choose NEMA PREMIUM type motors that conform to NEMA MG 1, minimum Class F insulation system. Motors with efficiencies lower than the NEMA PREMIUM standard may only be used in unique applications that require a high constant torque speed ratio (e.g., inverter duty or vector duty type motors that conform to NEMA MG 1, Part 30 or Part 31).

5.9.4. Solar Hot Water Heating. Provide at least 30% of the domestic hot water requirements through solar heating methodologies, unless the results of a Life Cycle Cost Analysis (LCCA) developed utilizing the Building Life Cycle Cost Program (BLCC) which demonstrates that the solar hot water system is not life cycle cost effective in comparison with other hot water heating systems. The type of system will be established during the contract or task order competition and award phase, including submission of an LCCA for government evaluation to justify non-selection of solar hot water heating. The LCCA uses a study period of 25 years and the Appendix K utility cost information. The LCCA shall include life cycle cost comparisons to a baseline system to provide domestic hot water without solar components, analyzing at least two different methodologies for providing solar hot water to compare against the baseline system.

5.9.5. Process Water Conservation. When potable water is used to improve a building's energy efficiency, employ lifecycle cost effective water conservation measures, except where precluded by other project requirements.

5.9.6. Renewable Energy Features. The Government's goal is to implement on-site renewable energy generation for Government use when lifecycle cost effective. See Paragraph 6, PROJECT SPECIFIC REQUIREMENTS for renewable energy requirements for this project.

## 5.10. FIRE PROTECTION

5.10.1. STANDARDS AND CODES Provide the fire protection system conforming to APPLICABLE CRITERIA.

5.10.2. Inspect and test all fire suppression equipment and systems, fire pumps, fire alarm and detection systems and mass notification systems in accordance with the applicable NFPA standards. The fire protection engineer of record shall witness final tests. The fire protection engineer of record shall certify that the equipment and systems are fully operational and meet the contract requirements. Two weeks prior to each final test, the contractor shall notify, in writing, the installation fire department and the installation public work representative of the test and invite them to witness the test.

5.10.3. Fire Extinguisher Cabinets: Provide fire extinguisher cabinets and locations for hanging portable fire extinguishers in accordance with NFPA 10 Standard for Portable Fire Extinguishers. The Government will furnish and install portable fire extinguishers, which are personal property, not real property installed equipment.

5.10.4. Fire alarm and detection system: Required fire alarm and detection systems shall be the addressable type. Fire alarm initiating devices, such as smoke detectors, heat detectors and manual pull stations shall be addressable. When the system is in alarm condition, the system shall annunciate the type and location of each alarm initiating device. Sprinkler water flow alarms shall be zoned by building and by floor. Supervisory alarm initiating devices, such as valve supervisory switches, fire pump running alarm, low-air pressure on dry sprinkler system, etc. shall be zoned by type and by room location.

5.10.5. Roof Access: Paragraph 2-9 of UFC 3-600-01 Fire Protection for Facilities will be modified in the next update to that UFC. Pending revision, comply with roof access and stairway requirements in accordance with the International Building Code. Where roof access is required by the IBC or other criteria, comply with UFC 4-010-01, Anti-Terrorist Force Protection, Standard 14. "Roof Access".

5.10.6. Fire Protection Engineer Qualifications: In accordance with UFC 3-600-01, FIRE PROTECTION ENGINEERING FOR FACILITIES, the fire protection engineer of record shall be a registered professional engineer (P.E.) who has passed the fire protection engineering written examination administered by the National Council of Examiners for Engineering and Surveys (NCEES), or a registered P.E. in a related engineering discipline with a minimum of 5 years experience, dedicated to fire protection engineering that can be verified with documentation.

## 5.11. SUSTAINABLE DESIGN

5.11.1. STANDARDS AND CODES: Sustainable design shall conform to APPLICABLE CRITERIA. See paragraph 6, PROJECT-SPECIFIC REQUIREMENTS for which version of LEED applies to this project. The LEED-NC Application Guide for Multiple Buildings and On-Campus Building Projects (AGMBC) applies to all projects. Averaging may be used for LEED compliance as permitted by the AGMBC but is restricted to only those buildings included in this project. Each building must individually comply with the requirements of paragraphs ENERGY CONSERVATION and BUILDING WATER USE REDUCTION.

5.11.2. LEED RATING, REGISTRATION, VALIDATION AND CERTIFICATION: See Paragraph PROJECT-SPECIFIC REQUIREMENTS for project minimum LEED rating/achievement level, for facilities that are exempt from the minimum LEED rating, for LEED registration and LEED certification requirements and for other project-specific information and requirements.

5.11.2.1. Innovation and Design Credits. LEED Innovation and Design (ID) credits are acceptable only if they are supported by formal written approval by GBCI (either published in USGBC Innovation and Design Credit Catalog or accompanied by a formal ruling from GBCI). LEED ID credits that require any Owner actions or commitments are acceptable only when Owner commitment is indicated in paragraph PROJECT-SPECIFIC REQUIREMENTS or Appendix LEED Project Credit Guidance

5.11.3. OPTIMIZE ENERGY PERFORMANCE. : Project must earn, as a minimum, the points associated with compliance with paragraph ENERGY CONSERVATION. LEED documentation differs from documentation requirements for paragraph ENERGY CONSERVATION and both must be provided. For LEED-NC v2.2 projects you may substitute ASHRAE 90.1 2007 Appendix G in its entirety for ASHRAE 90.1 2004 in accordance with USGBC Credit Interpretation Ruling dated 4/23/2008.

5.11.4. COMMISSIONING. See paragraph 5.8.5 COMMISSIONING for commissioning requirements. USACE templates for the required Basis of Design document and Commissioning Plan documents are available at <http://en.sas.usace.army.mil> (click on Engineering Criteria) and may be used at Contractor's option.

5.11.5. DAYLIGHTING. Except where precluded by other project requirements, do the following in at least 75 percent of all spaces occupied for critical visual tasks: achieve a 2 percent glazing factor (calculated in accordance with LEED credit EQ8.1) OR earn LEED Daylighting credit, provide appropriate glare control and provide either automatic dimming controls or occupant-accessible manual lighting controls.

5.11.6. LOW-EMITTING MATERIALS. Except where precluded by other project requirements, use materials with low pollutant emissions, including but not limited to composite wood products, adhesives, sealants, interior paints and finishes, carpet systems and furnishings,

5.11.7. CONSTRUCTION INDOOR AIR QUALITY MANAGEMENT. Except where precluded by other project requirements, earn LEED credit EQ 3.1 Construction IAQ Management Plan, During Construction and credit EQ 3.2 Construction IAQ Management Plan, Before Occupancy.

5.11.8. RECYCLED CONTENT. In addition to complying with section RECYCLED/RECOVERED MATERIALS, earn LEED credit MR4.1, Recycled Content, 10 percent except where precluded by other project requirements.

5.11.9. BIOBASED AND ENVIRONMENTALLY PREFERABLE PRODUCTS. Except where precluded by other project requirements, use materials with biobased content, materials with rapidly renewable content, FSC certified wood products and products that have a lesser or reduced effect on human health and the environment over their lifecycle to the maximum extent practicable.

5.11.10. FEDERAL BIOBASED PRODUCTS PREFERRED PROCUREMENT PROGRAM (FB4P). The Farm Security and Rural Investment Act (FSRIA) of 2002 required the U.S. Department of Agriculture (USDA) to



create procurement preferences for biobased products that are applicable to all federal procurement (to designate products for biobased content). For all designated products that are used in this project, meet USDA biobased content rules for them except use of a designated product with USDA biobased content is not required if the biobased product (a) is not available within a reasonable time, (b) fails to meet performance standard or (c) is available only at an unreasonable price. For biobased content product designations, see <http://www.biopreferred.gov/ProposedAndFinalItemDesignations.aspx>.

5.12. CONSTRUCTION AND DEMOLITION (C&D) WASTE MANAGEMENT: Achievement of 50% diversion, by weight, of all non-hazardous C&D waste debris is required. Reuse of excess soils, recycling of vegetation, alternative daily cover, and wood to energy are not considered diversion in this context, however the Contractor must track and report it. A waste management plan and waste diversion reports are required, as detailed in Section 01 57 20.00 10, ENVIRONMENTAL PROTECTION.

5.13. SECURITY (ANTI-TERRORISM STANDARDS): Unless otherwise specified in Project Specific Requirements, only the minimum protective measures as specified by the current Department of Defense Minimum Antiterrorism Standards for Buildings, UFC 4-010-01, are required for this project. The element of those standards that has the most significant impact on project planning is providing protection against explosives effects. That protection can either be achieved using conventional construction (including specific window requirements) in conjunction with establishing relatively large standoff distances to parking, roadways, and installation perimeters or through building hardening, which will allow lesser standoff distances. Even with the latter, the minimum standoff distances cannot be encroached upon. These setbacks will establish the maximum buildable area. All standards in Appendix B of UFC 4-010-01 must be followed and as many of the recommendations in Appendix C that can reasonably be accommodated should be included. The facility requirements listed in these specifications assume that the minimum standoff distances can be met, permitting conventional construction. Lesser standoff distances (with specific minimums) are not desired, however can be provided, but will require structural hardening for the building. See Project Specific Requirements for project specific siting constraints. The following list highlights the major points but the detailed requirements as presented in Appendix B of UFC 4-010-01 must be followed.

- (a) Standoff distance from roads, parking and installation perimeter; and/or structural blast mitigation
- (b) Blast resistant windows and skylights, including glazing, frames, anchors, and supports
- (c) Progressive collapse resistance for all facilities 3 stories or higher. Unless determined otherwise by the Installation and noted in paragraphs 3 or 6, the building shall be considered to have areas of uncontrolled public access when designing for progressive collapse.
- (d) Mass notification system (shall also conform to UFC 4-021-01, Mass Notification Systems)
- (e) For facilities with mailrooms (see paragraph 3 for applicability) – mailrooms have separate HVAC systems and are sealed from rest of building

## **6.0 PROJECT SPECIFIC REQUIREMENTS FORT BRAGG, NC**

### **6.1. GENERAL**

The requirements of this paragraph augment the requirements indicated in Paragraphs 3 through 5.

### **6.2. APPROVED DEVIATIONS**

The following are approved deviations from the requirements stated in Paragraphs 3 through 5 that only apply to this project.

6.2.1. 21 Sep 2010 ISEC approved waiver to I3A paragraph 2.4.3.1, which requires CATV demarcation point be located in Telecommunications Room. Ft. Bragg Paragraph 6.4.6.7(a) moves that to mechanical or electrical room.

### **6.3. SITE PLANNING AND DESIGN**

#### **6.3.1. General:**

6.3.1.1. Project Specific Requirements: See Attachment J for site features included in this task order/contract.

Attachment J, DRAWINGS provided under separate cover.

6.3.1.2. Fort Braggs' strategic goal is to achieve a "sustainable community - meeting the needs of the Soldier today, tomorrow and forever." To achieve this goal, Fort Bragg's philosophy is to apply systematic considerations of environmental impact, energy use, natural resources, economy, and quality of life so the end result is a sustainable community by:

- (a) Creating and enhancing sustainable training and urban areas to ensure military readiness and promote compatible growth of the surrounding community
- (b) Becoming the model sustainable military community by using sustainable principles throughout the life cycle of all facilities and supporting infrastructure
- (c) Achieving zero waste through acquisition and management of materials and commodities which throughout their lifecycle creates no additional waste nor requires resources for disposal
- (d) Supplying reliable services and infrastructure with no negative impacts while aggressively reducing overall demand.
- (e) Building a sustainable world-class ground transportation network providing seamless transition between multiple modes of travel while reducing harmful emissions
- (f) Creating a culture which fosters sustainable life style to enhance the quality of life of the Fort Bragg community. This encompasses the social, mental, physical and spiritual well-being of its members.
- (g) Minimize environmental impacts to natural resources using strategic planning and sustainable design to reduce project footprint ("clearing limits").

6.3.1.3. Fort Bragg's sustainable community objectives are energy savings, water savings/reuse; low-emitting, nontoxic materials, land/habitat loss minimization, reusable/recyclable building materials, tie in to "community" sustainability features (e.g. continuance of bikes lanes/walking paths), turf areas/water intensive landscapes minimization, use of native plants, and use of low-impact development strategies for stormwater management.

#### **6.3.1.4. Design Principles**

(a) Plan and design site in a sustainable manner in accordance with all applicable references. The planning and design shall incorporate appropriate measures to address endangered, threatened, and special concern species; energy efficiency and renewable generation; materials reuse; multimodal transportation; native wildlife

habitat protection and restoration; pollution prevention; public health and safety; water resources protection and restoration; and water use efficiency.

(b) Sustainable site plan, planning, design and development will address the need to conserve green space, preserve remnant old-growth trees, protect endangered species and wetlands, achieve maximum on-site stormwater infiltration, provide for greenways and link corridors of existing natural habitat for recreational value, quality of life and for wildlife/plants conservation. Sustainable site planning should include green space planning, and corridor development for recreational use and wildlife benefits. Construction footprint shall minimize disturbance to soils to the maximum extent practicable in support of the installation sustainability goals.

(c) Base site design on the Beaux-Arts principles of balance, axial arrangements, symmetry, and site lines.

(d) Plant native trees, shrubs and grasses in accordance with Fort Bragg's plant list palette. See Appendix I. Theme tree emphasis will favor longleaf pine to support ecosystem management policy, sustainability, endangered species conservation, and sustainable communities.

(e) Multiple historic districts and individual historic properties are present at Fort Bragg. Fort Bragg's Cultural Resources Management Program (CRMP) reviews all construction projects through the NEPA review and clearance process and assesses their impact on historic properties. Construction projects with the potential to affect historic properties require close coordination with CRMP throughout project development and execution. Projects determined to affect historic properties may require consultation with the North Carolina State Historic Preservation Office (SHPO) under Section 106 of the National Historic Preservation Act, as codified in 36 CFR 800. All SHPO consultations will be initiated by CRMP and are typically completed in 45 days (including the mandatory 30-day SHPO review period). Some projects may require multiple 30-day SHPO reviews to complete the consultation process. Project schedules must take into consideration and make allowance for the requirement of SHPO consultation. When SHPO consultation is required, the process must be complete prior to the commencement of construction activities. This project is not within a historic district or view shed and does not require consultation with the SHPO..

#### 6.3.1.5. Required Submission of Plans in Electronic Format

(a) At each submission stage project site plans and maps shall be submitted to Fort Bragg DPW, for review by Environmental Division (ED), in Bentley Microstation DGN V8 electronic format.

(b) The standard unit of measurement (horizontal and vertical) for all site plans and maps shall be the US Survey Foot.

(c) All site plans and maps shall be horizontally georeferenced to the NC State Plane Coordinate System, North American Datum of 1983 (NCSPCS, NAD83). All site plans and maps shall be vertically georeferenced to the North American Vertical Datum of 1988 (NAVD88).

(d) All maps and plans shall employ layers/levels per the US National CAD Standard (NCS). The project construction boundary shall be clearly depicted and labeled.

(e) The project construction boundary shall be comprised of closed polygons on the appropriate layer/level (C-PROP-CONS per the current NCS). Elements on the project construction boundary layer/level shall be limited to the project construction boundary. No other data will be placed on that layer/level.

Polygons shall be free and clear of duplicated vertexes and self-intersections. Point features such as borings, wells, trees, and test-pits shall be depicted by normal cells only (no shared cells).

#### 6.3.2. Site Structures and Amenities

6.3.2.1. Supporting site structures shall preferentially include EPA-designated recovered materials products, USDA-designated bio-based products, and environmentally preferable products. The items identified in Appendix NN used in construction contracts must meet or exceed USDA Biobased and EPA RMAN requirements. Exemptions to the use of EPA-designated recovered materials products, USDA-designated bio-based products, and environmentally preferable products based on availability and performance must be cleared by the Sustainable Materials Planner or Sustainable Facilities Planner.

6.3.2.2. Supporting site structures shall utilize the same building materials and characteristics as the adjacent buildings. Provide the following site structures and amenities:

(a) Dumpster Screening shall match or compliment the surrounding facilities and current dumpster systems in the area. Locate dumpster pad to minimize backing of trash transfer vehicles. Locate dumpster pads and

screening in accordance with setbacks in UFC 4-010-01. Access to dumpster pads should not be thru parking lots whenever possible to preclude mixing of large trucks, POVs, and GOVs. When required, limit the dumpster unloading vehicle backup distance to minimum distance possible.

6.3.2.3. Exterior Signage

6.3.3. Site Functional Requirements:

6.3.3.1. Stormwater Management Systems.

(a) The project shall be meet National Pollutant Discharge Elimination System (NPDES) requirements for stormwater management

(b) Comply with the NPDES General Stormwater Permit Requirements and all other associated NPDES permit requirements. The general permit is issued along with the Erosion Control permit from the NC Department of Environment and Natural Resources (NCDENR) - Land Quality Section and includes requirements to record rainfall events at the site, visually monitor and maintain records of the stormwater discharge, and maintain a log of the corrective actions required to remain in compliance. The contractor shall maintain records until the erosion control permit has been closed out by NCDENR.

(c) Develop and submit a Storm Water Pollution Prevention Plan (SWPPP) to the Contracting Officer's Representative (COR) and to the Ft. Bragg Water Management Branch for approval. After receiving approval from the Water Management Branch and concurrence from the COR, submit the SWPPP to the NC Division of Water Quality for approval. Pay all permit related fees. If the plan is found to be deficient correct the deficiencies and resubmit the plan.

(d) Design the permanent stormwater treatment measures to comply with NCDENR requirements as laid out in the NC Division of Water Quality's Stormwater BMP Manual. A copy of the BMP manual can be obtained at <http://portal.ncdenr.org/web/wq/ws/su/bmp-manual>.

(e) In addition to the NCDENR requirements:

(i) Design the permanent measures to keep the post construction rate of stormwater discharge for the 10 year, 24 hour storm at or below the pre-developed discharge rate.

(ii) Design the permanent measures to accommodate the 100 year, 24 hour storm without significant flooding or damage to the stormwater system and facilities/improvements in the surrounding area.

(iii) Calculate the pre-developed discharge rate and quantity of discharge as if the site was completely undeveloped forest land.

(iv) For Ft. Bragg use the following storm estimates. (1 year, 1 hour, 1.5 inches), (2 year, 1 hour, 1.8 inches), (10 year, 24 hour, 5.4 inches), (25 year, 24 hour, 6.5 inches), (50 year, 24 hour, 7.3 inches) and (100 year, 24 hour, 8.2 inches).

(v) Design the permanent measures to keep the post construction quantity of stormwater discharge for the 95 percentile rain event (1.8 inch 24 hr rainfall) at or below the pre-developed quantity of discharge unless it can be shown to be technically unfeasible due to soil types and/or space constraints. Infiltration of the stormwater runoff from the first 1.8 inches of rainfall is preferred, however, if infiltration is not technically feasible other uses of the excess stormwater such as on site storage for irrigation shall be investigated. Uses other than infiltration must receive approval from Ft. Bragg. Reference EISA 2007 Section 438 and EPA 841-B-09-001 Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act.

(f) Employ Low Impact Design (LID) to the Maximum Extent Practicable. Stormwater management shall focus on infiltration of stormwater and natural methods of pollutant removal. The use of vegetated filter strips and buffers, the conveyance of stormwater by vegetated swales rather than pipes, the use of curb cuts rather than curb inlets, the use of several small grass lined infiltration pools rather than one large basin, and the use of grass paving products for emergency vehicle access lanes rather than concrete or asphalt are preferred. For sites that infiltration has been found to be unfeasible, the stormwater system shall focus on quality (nutrients/sediments/pollutants) and rate of discharge.

(g) Do not use the following structural stormwater management measures without prior approval of the Water Management Branch, Directorate of Public Works: permeable/pervious pavements, green roofs, subsurface infiltration chambers, curb inlets and sand filters.

(h) Perform borings for potential stormwater management features to identify seasonal high water table as required by the NCDENR Division of Water Quality Best Management Principles Manual.

#### 6.3.3.2. Erosion and Sediment Control

(a) Prepare an Erosion Control Plan (ECP) in accordance with the North Carolina Erosion and Sediment Control Planning and Design Manual, latest revision.

(b) The North Carolina Sedimentation Control Pollution Act of 1973, decrees that any land disturbing activity over an acre must have approved sediment and erosion control plan before construction begins. In addition, the Installation requires that all land disturbing activity, regardless of size, have an approved sediment and erosion control plan before any land disturbing activity can commence.

(1) The Fort Bragg Water Management Branch must approve all sediment and erosion control plans prior to submittal to the North Carolina Department of Environment and Natural Resources (NCDENR). Sediment and Erosion control plans must bear the Fort Bragg Storm Water Management Branch stamp prior to acceptance by NCDENR. Both agencies will review the plan(s) to ensure that all measures to retain sediment on the site during construction and all measures to prevent erosion after construction have been designed into the construction drawings. Agencies will review sediment control measures such as silt fence, temporary sediment traps, and construction entrances/exits for the proper sizing and installation.

(2) Once the plan(s) is approved, the Ft. Bragg Water Management Branch, the Corps of Engineers and the NCDENR will inspect construction to ensure that all work is performed in adherence to the approved plan.

(3) The site shall meet the appropriate High Density Design Requirements as described in the most current edition of North Carolina Stormwater Best Management Practices Manual. Reference website can be found at Appendix BB.

(4) Prior to any revision or deviation from the approved set of Sediment and Erosion control plans, submit new plans to Fort Bragg Storm Water Management Branch for approval prior to submission to NCDENR following the same process as outlined above.

(c) All pond type trash racks shall be solid walled, anti-vortex devices. Bar-type trash racks are unacceptable.

#### 6.3.4. Site Structures and Amenities

No additional requirements.

### 6.4. SITE ENGINEERING

#### 6.4.1. Existing Topographical Conditions

6.4.1.1. See Appendix J for a topographic survey and the site plan showing this project for information only. Coordinate the design with tie in points provided. Verify the information provided and any discrepancies that are found in the furnished survey and bring this information to the immediate attention of the Contracting Officer for clarification. Any additional survey required for the complete design and construction of this project shall be the responsibility of the Contractor.

No additional requirements.

#### 6.4.2. Existing Geotechnical conditions: See Appendix A for a preliminary geotechnical report.

6.4.2.1. Verify the results of the Government supplied information provided and bring any discrepancies found in the finished survey to the immediate attention of the Contracting Officer for clarification. The provided site layout drawings are for guidance but the Contractor proposed site layout shall be similar in design

6.4.2.2. Locate primary facilities to avoid existing above and below ground utilities, government and privatized, traversing the site whenever possible.

6.4.2.3. Locate primary facilities in accordance with all AT/FP requirements.

6.4.2.4. Coordinate the new construction activities and erosion control measures with the adjacent facilities and erosion control measures.

6.4.2.5. Limits of Construction:

(a) The Limits of Construction are shown on the provided drawings. Confine all work within the Limits of construction except as needed to tap into existing utility lines or maintenance holes.

(b) Provide drawings to Fort Bragg to coordinate locator service outside of construction limits prior to conducting any digging outside of the construction limits.

6.4.3. Fire Flow Tests See Appendix D for results of fire flow tests to use for basis of design for fire flow and domestic water supply requirements.

6.4.4. Pavement Engineering and Traffic Estimates:

6.4.4.1. A professional engineer, licensed in the State of North Carolina, shall design all rigid and flexible pavements in accordance with the Contractor's final geotechnical report.

6.4.4.2. Vehicular Parking Areas

(a) Do not use permeable pavements, including segmented pavers, pervious concrete or pervious asphalt in vehicular parking and other pavements.

(b) Design parking areas surface slopes between 0.5% and 2% with a maximum of 3% in the parking stalls. Layout parking lots so that drainage conforms to the existing general site contours to provide the maximum utilization of water gardening or bio-retention ponds on site.

(c) Hardstand slopes shall be between 0.5% and 2.0%. Slope all hardstands away from readiness and covered hardstands.

(d) Design parking lots to avoid ponding of water.

(e) Wheel stops shall be slotted along bottom edge to allow water to pass beneath the wheel stop.

(f) Parking Area access lanes shall be a 24 ft wide minimum from the edge of pavement.

(g) Motorcycle parking spaces shall be concrete, 9' x 18' long with appropriate signage. Locate motorcycle parking pad at end of parking lines to allow up to 4 motorcycles to be parked in one spot using the 18 foot side. Identify kickstand locations with inset steel plates.

6.4.4.3. Emergency Vehicle Access and Service Drives. Design emergency vehicle access with NFPA, UFC 3-600-01, and as required by the Installation (FB Fire Dept is AHJ). Consider an option for use of grass paver type products for emergency vehicle access if soils engineering studies indicate ground can support such structures.

6.4.4.4. Vehicle Crash Barriers (as applicable to certain facility types)

(a) Locate vehicle crash barriers at all emergency vehicle access and service drives to barracks and battalion headquarters buildings and all service drives leading to the company operation facilities service yard.

(b) Vehicular crash barriers shall be pad lockable in the open and closed position and meet the minimum crash certification of K1.1/L3. Barrier arm surface shall have a rust inhibiting painted surface and shall be furnished with 4-inch wide reflective paint spaced at every 20 inches.

(c) Drop arm barrier shall be counter weighted for ease of lifting by a single person.

(d) The use of removable, bollard type barriers is not allowed. Locate AT/FP measures in accordance with applicable criteria.

6.4.4.5. Sidewalks

(a) Sidewalks shall provide an ample functional system of walks connecting structures, parking areas, streets, and other walks as pedestrian traffic demands. In addition, carefully review paths of travel between buildings within this and adjacent complexes to determine a layout of sidewalks that is sufficient to meet the likely paths of travel.

- (b) Locate sidewalks a minimum of 5 feet from main roads and streets. Slope sidewalks to meet all requirements for ADAAG. Construct sidewalks of Portland Cement Concrete.
- (c) Emergency vehicle access and service drives shall be a concrete sidewalk designed to support multi-story ladder trucks weighing 75,500 pounds on three axles; two axles are double tired.

#### 6.4.4.6. Flexible Pavement Design

- (a) Design heavy duty flexible pavements to support H-20 loading.
- (b) Design light duty flexible pavements to support 5,000 lb axial loading.
- (c) Pavement designs over cohesive soil subgrades require under-drain systems.
- (d) The flexible pavement design shall be larger of the calculated flexible design thickness and the minimum flexible design thickness.

#### 6.4.4.7. Rigid Pavement Design

- (a) Design rigid pavements to support H-20 loading.
- (b) The minimum pavement section shall be 6 inches rigid concrete pavement over 6 inches of compacted aggregate base course.
- (c) Pavement designs over cohesive soil subgrades require under drain systems.
- (d) Provide a concrete joint layout plan for all concrete pavements. Show joint spacing, joint types, and joint grading.

#### 6.4.4.8. Additional Requirements:

None.

#### 6.4.5. Traffic Signage and Pavement Markings

6.4.5.1. A Professional Engineer (PE) licensed in the State of North Carolina, qualified and experienced in traffic engineering and signal design must perform traffic signalization plans and design work to include road closure plans.

6.4.5.2. All pavement marking and road way signage shall be in compliance with the Manual of Uniform Traffic Control Devices (MUTCD) and Federal Highway Administration (FHWA) policies.

6.4.5.3. Four (4) inch thermoplastic white reflective material is the only authorized material for stripping.

#### 6.4.6. Base Utility Information

##### 6.4.6.1. General.

- (a) Prior to interim (or final if no interim package) site design, coordinate and validate with the survey on the locations and sizes of all existing utility services, above and below ground.
- (b) Install and reconnect temporary utilities for buildings which are supported by utilities which will be demolished/or relocated during construction. Coordinate service interruption two weeks in advance with the DPW. Sandhills Utilities Service will supply the electric meter.
- (c) All Building Utility meters including but not limited to: Water, Gas and Electric shall be compatible with the Army metering program pursuant to Public Law 109-58, Section 103 of the Energy Policy Act of 2005. The intent is for all utility meters to report their data to the installations base-wide Utility Monitoring and Control System (UMCS). The utility meters must provide data at least daily and measure at least hourly consumption of electricity. The means for meter data transmission will be by using ANSI/CEA 709.1b (LONWorks). Wireless is not an approved means of communication at Fort Bragg. A key element for success will be integrating these systems with the Installation's UMCS. Coordinate type of metering required for DDC monitoring with Energy Manager. Contact the DPW for more detailed specifications.

- (1) All new buildings shall have a water meter installed and connected back to the Utility Monitoring & Control System (UMCS) via the buildings Direct Digital Control (DDC) system. The privatized utility provider, Old North Utility Services, Inc. (ONUS) will provide and install the meter under separate contract with the Government. The Contractor is responsible for electrical connections to the meter under this contract.
- (2) Install a gas meter in all new buildings and connect back to the Utility Monitoring & Control System (UMCS) via the buildings Direct Digital Control (DDC) system. The meter shall send a Pulse output to the DDC system.
- (3) Electrical power metering/ monitoring shall be from a digital metering on the main power panel (service entrance). Transfer data to the DDC panel by installed conduit and cat 6 cabling (not from the building transformer meter.) Provide a 1-inch conduit from the electric utility meter to a data collection point located in a DDC panel inside the building mechanical room. In addition, provide CAT 6 cable from the communications room to the building point of connection (BPOC) located a DDC Control panel in the building mechanical room. Coordinate location with the Ft. Bragg UMCS manager.

6.4.6.2. Storm drainage service and natural gas on this installation is not privatized.

6.4.6.3. Water and Sanitary Sewer Services:

- (a) Water and Sanitary Sewer services on this installation are privatized. Contact Old North Utility Services, Inc. (ONUS), 110 N. Fourth St., Spring Lake, North Carolina 28390, 910-495-1311.
- (b) Provide one separate fire sprinkler service connection, one separate potable water service connection and one separate sanitary sewer service connection per building.
- (c) ONUS will act as a Prime Contractor (in a separate contract between the Government and ONUS) for design and construction of exterior potable water, fire water and exterior sanitary sewer to points of connection identified in Appendix C.
- (d) Coordinate water requirements and connections with ONUS.
- (e) Coordinate sewer requirements and connections with ONUS. No tapping of the existing water distribution or sanitary sewer system is authorized without prior approval of ONUS.
- (f) ONUS is responsible for filing, maintaining and closing water permits and sanitary sewer permits for the project. Contact ONUS for a copy of the latest approved installation standards and specifications.
- (g) Model the fire flows and inlet pressures for this facility in concert with ONUS to construct a water distribution model. Verify that the fire flow and pressure requirements for the new facility are less than or equal to the modeled flows and pressures.

6.4.6.4. Natural Gas: The existing underground gas distribution system at Fort Bragg is not privatized.

- (a) An 8" gas line is located adjacent to the project site along Keerans Street, and is available for use for this project. This gas line is managed by Ft. Bragg DPW, contact number (910) 432-9760. Interruption of gas service to existing buildings shall be avoided during the construction of these facilities.
- (b) Honeywell manages gas utility service laterals at Simmons Army Airfield and those which feed individual buildings on Fort Bragg; that are Honeywell installed. See Appendix C for POC.
- (c) Fort Bragg manages the remaining natural gas laterals on Fort Bragg and Pope Air Force Base. See Appendix C for POC.
- (d) The distribution system pressure is approximately 22 psig to 30 psig. If gas is determined to be the most life-cycle cost effective alternative, the system design shall comply as follows:
  - (1) Contractor shall design, tie-in, layout/route and install gas distribution system up to and within the facility (including the gas meter/regulator assembly).
  - (2) Coordinate and field verify site conditions prior to performing any work. See Appendix C (Utility Connection) and the site plans for additional information.
  - (3) Install copper or other metallic tracer wire for all new non-metallic gas lines (natural and LP). Install the tracer wire below the pipe and connect from manhole to manhole (valve to valve, etc) with enough additional length for the end to reach the ground surface for the attachment of energizing equipment. Wire shall enter the manhole so it is not cut or severed during installation. Also install metallic marking tape, approximately 18 inches below ground surface.



6.4.6.5. Chilled and Hot Water. Honeywell manages Chilled and Hot Water: Chilled Water (CW), and High Temperature Water (HW) utility services on Fort Bragg. See Appendix C, (Utility Connection) for additional information and POC.

6.4.6.6. Communications System (Government)

(a) Communication service on this installation is owned by the Government. Design and install the Outside plant (OSP) communication infrastructure including cabling from a designated maintenance hole or service delivery point into the facility main telecommunications room.

(b) Complete the design and full construction of the work to include all cable splicing, count changes, reconfigurations, over overbuilds.

6.4.6.7. Cable Television (CATV) Service

(a) Extend one 4-inch duct from the CATV backboard to nearest maintenance hole or handhole in the site vicinity. Do not locate CATV demarcation point in the facility telecommunications room. CATV service provider shall coordinate with DPW for location of CATV demarcation point, usually placed in the mechanical or electrical room.

(b) Time Warner Cable Company (TWC) will provide and install service cabling throughout the project site, at the CATV demarcation point located in the facility mechanical or electrical room.. Coordinate site/facility interfaces with TWC.

(c) See Appendix C: UTILITY CONNECTIONS for additional information and requirements.

(d) Provide single sheet 3/4" A-C fire-rated backboard in room where CATV building entry is located. Plywood type as per I3A para. 2.5.6.

(e) Provide additional dedicated power outlet and grounding bar at CATV building entry area.

6.4.6.8. Telephone Service (Private Company)

The local telephone company, CENTURYLINK, will design and install outside plant (OSP), local (private) telephone service (e.g., subscription service to permanent party barracks). Coordinate with CENTURYLINK to assure duct line entry into the building.

6.4.6.9. Exterior Electrical Distribution System

The privatized electrical system contractor, Sandhills Utilities Services (SUS), will design and construct site electrical primary distribution to and within the project site under separate contract with the Government. See paragraph 6.9 and Appendix C (Utility Connection) for additional information and POC.

6.4.6.10. Underground Utility – Road Crossings. Use under-ground boring systems for all underground utilities that cross active road crossings to tie into existing utilities. Do not use open trench methods to cross roads unless a last resort and specifically approved by the Fort Bragg Director of Public Works. Support all piping, using spider spacers. Supporting with oak boards is not allowed.

6.4.7. Cut and Fill

6.4.7.1. Limit earth cut and fill slopes to no steeper than 3 horizontal to 1 vertical. Retaining or segmented walls are an option to limit the cut and fill. These slopes include the borrow pit.

6.4.7.2. Rough and possibly no cut/fill or grading in construction areas. Fill depression/holes from the removal building foundations and basements.

6.4.7.3. Compaction requirements shall be in accordance with ASTM D1557 (modified proctor), not ASTM D698 (standard proctor). The licensed geotechnical engineer or his authorized representative shall inspect, evaluate and approve all subgrades (pavements, floor slab, or foundation) prior to placement of overlying construction materials, as appropriate.

6.4.7.4. Ensure that the licensed project design geotechnical engineer oversees and directs proof rolling operations (for subgrade suitability); fill placement and compaction operations, including associated soil properties, compaction, and field density testing; and footing inspections on a full time basis. A Corps of Engineers validated geotechnical testing firm shall inspect, test, and document earthwork construction

6.4.8. Borrow Material: Presently there IS an available Borrow Pit(s) on Ft. Bragg. See location Plan. A permit is required to use the Fort Bragg soil borrow material pits per Section Borrow Pit permit.

6.4.9. Haul Routes and Staging Areas

6.4.9.1. See Location Plan for haul routes. Utilize only those haul routes identified on the drawing set included in this RFP.

6.4.9.2. Additional Site Requirements

(a) Identification of Employees. Provide to each employee and require each employee engaged on the work site to display identification as approved and directed by the Contracting Officer. Deliver prescribed identification to the Contracting Officer for cancellation upon release of any employee. When required, obtain and provide fingerprints of persons employed on the project. All personnel shall wear identifying markings on hard hats to clearly identify the company for whom the employee works.

(b) Employee parking. Employees shall park privately owned vehicles in an area designated by the Contracting Officer. This area will be within reasonable walking distance of the construction site. Employee parking shall not interfere with existing and established parking requirements of the Installation.

(c) Temporary Facilities. Administrative Field Offices: Provide and maintain administrative field office facilities within the construction area of the designated site unless approved by the Contracting Officer and the Installation. Government office and warehouse facilities are not available to the Contractor's or subcontractors' employees.

(d) Storage Area. Trailers, equipment, or materials shall not be open to public view with the exceptions of those items which are in support of ongoing work on any given day. Do not stockpile materials outside the fence in preparation for the next day's work. Park mobile equipment, such as tractors, wheeled lifting equipment, cranes, trucks, and like equipment within the fenced area at the end of each work day. Locate construction trailer(s) within limits of construction. Locate the laydown yard/storage area within the limits of the construction area unless previously approved by the Contracting Officer and the Installation.

(e) Temporary Utilities. All temporary utilities (water, sewer, electrical, telecommunications, etc) will be at the Contractor's expense and subject to Fort Bragg regulations. In the case of privatization utility Contractors, the Utility cost information is at Appendix K. Contractor must negotiate and contract with the privatization utility directly without benefit of the Government

(1) Coordinate with ONUS for any temporary water and sanitary sewer service. ONUS will provide estimate for connection costs.

(2) Coordinate with Sandhills Utilities Services for any temporary electrical services. Sandhills Utilities Services will provide estimate for connection costs.

(f) Appearance of Trailers, Storage Spaces, and Other Facilities within the Laydown Yard. Storage equipment and facilities used for administrative or material storage purposes shall present a clean and neat exterior appearance and shall be in a state of good repair. Trailers, which, in the opinion of the Contracting Officer, require exterior painting or maintenance, will not be allowed on the Installation.

(g) Maintenance of Storage Area. Keep fencing in a state of good repair and proper alignment. Should the Contractor elect to traverse, with construction equipment or other vehicles, grassed or unpaved areas, which are not established roadways, cover such areas with a layer of gravel as necessary to prevent rutting and the tracking of mud onto paved or established roadways. Gravel gradation shall be at the Contractor's discretion. Mow grass located within the boundaries of the construction site for the duration of the project. Trim grass and vegetation along fences, buildings, under trailers, and in areas not accessible to mowers and edge neatly.

(h) Security Provisions. Provide adequate outside security lighting at all temporary facilities. The Contractor shall be responsible for the security of its own equipment. Notify the appropriate law enforcement agency requesting periodic security checks of the temporary project field office

(i) Project Safety Fencing. As soon as practical, but not later than 15 days after the date established for commencement of work, furnish and erect temporary project safety fencing around the construction site. This

fencing shall remain the property of the Contractor. The safety fencing shall be 9 gauge chain link fence, a minimum of 72 inches high, supported and tightly secured to steel posts located on a maximum of 10 foot centers, constructed at the approved location. Maintain the safety fencing during the life of the contract and upon completion and acceptance of the work remove all fencing from the work site. Prior to erection of any temporary project safety fencing, coordinate with Fort Bragg DPW Transportation Engineer, Ray Goff; 910-907-1759 to check appropriate traffic safety sight lines. Installation and locating of project safety fencing shall consider sight triangles at intersections, curves, and construction entrances.

(j) Temporary Hazard Safety Fencing. Furnish and erect safety fencing at temporary hazards and work site areas considered to be hazardous to the general public. This fencing shall remain the property of the Contractor. The safety fencing shall be high visibility orange, high density polypropylene grid or approved equal, a minimum of 42 inches high, supported and tightly secured to steel posts located on maximum 10 foot centers, constructed at the approved location. Maintain the safety fencing during the life of the hazard and remove all fencing upon completion and acceptance of the work.

(k) Cleanup. Remove construction debris, waste materials, packaging material and the like from the work site daily. Clean up any dirt or mud which is tracked onto paved or surfaced roadways. Store materials resulting from demolition activities which are salvageable within the fenced area described above or at a supplemental storage area. Neatly stack stored materials, not in trailers, whether new or salvaged.

(l) Restoration of Storage Area. Restore areas used by the Contractor for storage of equipment or material, or other use, to the original or better condition. Remove gravel used to traverse grassed areas and restore the area to original condition, including top soil tree and vegetative replanting and seeding, as necessary.

(m) Building and Crane Height Restrictions. Verify construction activities do not interfere with Simmons Army Airfield or Pope Air Force Base aircraft glide slopes and FAA height restrictions. Submit FAA Form 7460-1 for all cranes to be used on each building and for each building in the project to the FAA. Submit this form to the FAA a minimum of 60 days before the cranes arrive on site and the vertical construction of the buildings start. FAA Form 7460-1 is available from the Contracting Officer's Representative (COR) at the area office.

#### 6.4.10. Clearing and Grubbing:

##### 6.4.10.1. Clear and grub all brush and vegetation from the designated site area.

6.4.10.2. Tree Removal Plan. Develop a Tree Removal and Restoration Plan. Include a pre-existing tree survey (drawing) that clearly depicts: removed and retained trees; a table containing type tree species, size range (dbh) and number of trees to be removed and a functional replacement value for each size range (if tree replanting is applicable ), as outlined by the Fort Bragg Tree Replacement Policy and Table, Appendix II.

(a) For projects under one acre, the tree survey will document tree size (by dbh), species, and location on the pre-existing tree survey drawing. Include the table identified above.

(b) Projects impacting vegetation will require habitat restoration (e.g. controlled burns, thinning, and/or mechanical or chemical mid-story hardwood removal) or tree restoration contingent upon project location and scale. Fort Bragg DPW Environmental Branch compliance officer will notify DPW and COE project manager and determine habitat or tree restoration requirements.

(c) Tree replacement plans must attempt functional replacement value by replanting trees on-site. If not applicable, replace trees off-site or a combination of both on-site and off-site may apply. Projects > 1 acre determine tree functional tree replacement value is at a ratio of 1:1 (acre for acre) to eliminate negative forest fragmentation effects. Include replanting locations and planting specification with each design submittal.

(d) Landscaping plan must consider providing species diversity, green space planning, corridor development, wildlife value, etc. Plantings must consider "natural community" (i.e., aggregate clumping and composition, and structural layers (ground, mid-story and over-story). Green space areas should be juxtaposed to preexisting natural habitat to facilitate dispersal pathways (e.g., population demographics) for animals and plants, as well as, provide for recreational value.

(e) Plant pine trees during late fall (October-November) or early spring (February-March) to ensure maximum survivability and diminish likelihood of replacement. All replanting will be covered under a one year warranty and will be replaced under corresponding project funding.

Habitat restoration may be required in lieu of tree replacement contingent upon federal regulator guidance, available tree replacement locations, and benefit to impacts natural resources. Habitat restoration will be specified

by the appropriate Environmental Management Branch subject matter experts and associated costs will be requested and included in the overall project funding. Habitat restoration may include one or a combination of the following: controlled burns, pine thinning, and/or mechanical or chemical mid-story hardwood removal.

6.4.10.3. Timber Harvesting. This project requires timber harvesting and merchantable tree sales are required for this site. Delineate the clearing limits by placing BLUE paint on perimeter trees on the side facing the area to be cleared. Notify the Government when this has been accomplished. Designate representative knowledgeable about the marking to answer any questions that may arise regarding clearing limits. Merchantable Timber is defined as: Government assets of pine trees greater than 5 inches in diameter at 4.5 feet above the ground (DBH) and hardwood trees greater than 10 inches DBH shall be considered as merchantable timber. The Government will make arrangements for their timber harvesting crews to clear the timber. Allow the Government 60 calendar days to remove merchantable timber once the Contractor has flagged the trees to be removed. Merchantable timber sales do not include stump or limb removal. Remove all stumps and limbs from the project site. A valid NCDENR sediment and erosion control permit is required prior to removal of stumps from the project site.

(a)

6.4.11. Landscaping:

6.4.11.1. Develop a sustainable landscape plan in accordance with the Installation sustainable communities' goals and priority.

6.4.11.2. Plant native trees, shrubs and grasses in accordance with Fort Bragg's plant list palette (Appendix I). Theme tree emphasis favors longleaf pine to support ecosystem management policy, sustainability, endangered species conservation, and sustainable communities.

(a) Place dense native evergreen mass vegetation (such Yaupon Holly, *Ilex vomitoria*, shrubbery) along all concrete, gravel, soil, and other pathway intersections to prevent 'short-cutting' outside the designated pathway surface. The length of dense native evergreen mass vegetation plantings shall generally extend at least 15 feet from the intersection edge along each pathway

(b) Do not specify invasive and/or exotic species (plant materials) in the Landscape Plan.

(c) Consider site utilities when developing the landscape plan to prevent conflicts. Avoid placing trees under light fixtures or shrubs in front of equipment doors and fire hydrants.

(d) If a temporary irrigation system is used, its use shall be limited to a period of one year to support turf establishment". Remove the system upon completion of turf establishment.

6.4.11.3. The source water for all areas receiving irrigation shall be from rainwater harvesting, process water recovery, or other non-potable source. This does not include water wells.

6.4.12. Turf: Provide turf in all high traffic troop congested areas such as barracks, administrative facilities and dining facilities.

(a) Use centipede grass (*Eremochloa ophiuroides*) for low traffic grass turf areas.

(b) Use zoysia grass (*Zoysia* spp) for high traffic grass turf areas.

(c) The Fort Bragg preferred turf and seeding requirements are in Appendix I.

## 6.5. ARCHITECTURE

6.5.1. General: To the maximum extent possible within the contract cost limitation, the buildings shall conform to the look and feel of the architectural style and shall use the same colors as adjacent facilities as expressed herein. The Government will evaluate the extent to which the proposal is compatible with the architectural theme expressed in the RFP during the contract or task order competition. The first priority in order of importance is that the design provides comparable building mass, size, height, and configuration compared to the architectural theme expressed herein. The second priority is that design is providing compatible exterior skin appearance based upon façade, architectural character (period or style), exterior detailing, matching nearby and installation material/color pallets, as described herein.

## 6.5.2. Design

6.5.2.1. Appendix F is provided "For Information Only", to establish the desired site and architectural themes for the area. Appendix F identifies the desired project look and feel based Fort Bragg's Installation Architectural Theme from existing and proposed adjacent building forms; i.e. building exterior skin, roof lines, delineation of entrances, proportions of fenestration in relation to elevations, shade and shadow effects, materials, textures, exterior color schemes, and organizational layout.

6.5.2.2. The design should address Fort Bragg's identified preferences. Implement these preferences considering the following:

- (a) Achievable within the Construction Contract Cost Limitation (CCL)
- (b) Meets Milestones within Maximum Performance Duration.
- (c) Achieves Full Scope indentified in this Solicitation
- (d) Best Life-Cycle Cost Design
- (e) Meets the Specified Sustainable Design and LEED requirements.
- (f) Complies with Energy Conservation Requirements Specified in this RFP.

6.5.2.3. Priority #1 Visual Compatibility: Facility Massing (Size, Height, Spacing, Architectural Theme, etc.), Exterior Aesthetic Considerations: The buildings massing, exterior functional aesthetics, and character shall create a comprehensive and harmonious blend of features that are sympathetic to the style and context of the Installation. The Installation's intent for this area is as indicated in Appendix F. Site and architectural conceptual drawings that meet this objective are shown in Appendix F.

6.5.2.4. Priority #2. Architectural Compatibility: Exterior Design Elements (Materials, Style, Construction Details, etc.) Roofs, Exterior Skin, and Windows & Door Fenestrations should promote a visually appealing compatibility with the desired character while not sacrificing the integrity and technical competency of building systems.

6.5.2.5. See Appendix F for exterior colors that apply to Architectural character at Fort Bragg. The manufacturers and materials referenced are intended to establish color only, and are not intended to limit manufacturers and material selections.

6.5.2.6. Additional architectural requirements:

- (a) Install fall protection anchor points on all roofs with a slope greater than 2:12
- (b) Provide a Knox 4400 Series (single lock model) recessed wall mounted key vault for Fire Department use at each building exterior. Locate adjacent to the main building entrance. Coordinate purchase of key vault through the Installation Fire Department for purchase order information and forms.
- (c) In addition to building number signage on building as indicated in paragraph 5, provide freestanding exterior building signage in accordance with Appendix H.
- (d) No building shall be over six stories or penetrate identified air space management zones.
- (e) Exterior Wall Protection: Construct the bottom five feet of exposed exterior walls of a durable material resistant (masonry or equivalent) to moisture damage and decay as well as impact damage caused during day-to-day soldier activities expected for the function of the facility. Material shall be easily maintained and/or repaired.
- (f) Prepare and present for approval an exterior building finishes scheme no later than at interim design submittal. Present original samples of this scheme to reviewers no later than at the interim design review conference for each facility included in the contract.
- (g) See Appendix L for Installation LEED preferences relating to exteriors.

6.5.3. Programmable Electronic Key Card Access Systems:

6.5.3.1. Programmable electronic key card access systems is not required in the TEMF.

6.5.3.2. Installation Key System: Installation keying system for non-card locks is Best Lock Corporation. Cores for locksets other than those for mechanical, electrical and communications rooms only shall extend the existing Installation Keying System. Key locksets for mechanical, electrical and communications rooms to the existing Post Utilities Master Keying System. All locksets and exit devices shall accept the same interchangeable cores.

#### 6.5.4. INTERIOR DESIGN

6.5.4.1. Prepare and present for approval an interior building finishes scheme no later than at interim design submittal. Present original samples of this scheme to reviewers no later than at the interim design review conference for each facility included in the contract. Interior color scheme for each facility shall comply with one of the color schemes indicated for the facility type in Appendix F.

6.5.4.2. Toilet rooms, vestibules, bulkheads, stairs, message center, mail sorting, telecom rooms/SIPR (where specifically applicable to Project) and storage rooms will have painted gypsum board ceilings that meet CRITERIA. Mechanical rooms will have exposed structure. All other areas, including electrical rooms, will have two foot by two foot Omni-directional mildew resistant/moisture resistant acoustic ceiling tiles.

6.5.4.3. Provide a State of North Carolina licensed elevator inspector to inspect the installation, test all new elevators, applicable to project, and certify in writing that they meet all requirements. Provide the preventive maintenance program for the elevator for the initial warranty period of one year.

6.5.4.4. Where gypsum wall board (GWB) is used for interior walls, provide impact resistant GWB. For high abuse areas such as corridors. Interior paint shall be semi-gloss in wet areas and eggshell in all other areas. Provide ceramic tile walls, minimum 6'-0" high in toilet rooms and janitor closets.

6.5.4.5. Items not included in contract (NIC):

(a) The Government will Provide and install (GF/GI) Furniture and accessories under separate contract.

(b) While fire extinguisher brackets and cabinets are Contractor furnished, the fire extinguishers are not in contract.

#### 6.6. STRUCTURAL DESIGN

6.6.1. Treat subgrades under all facility foundations to resist subterranean and other wood destroying insects known to exist in the vicinity of the site. Treatment shall be in accordance with the environmental criteria referenced in this document.

6.6.2. Slabs on Grade. All interior slabs on grade, including storage and mechanical rooms, garages and carports, shall be underlain by a moisture vapor barrier consisting of lapped polyethylene sheeting having a minimum thickness of 6 mil and a minimum 4-inch thick capillary water barrier of open graded, washed pea gravel, or crushed stone, such as Nos. 57, 67, 78 or 89, except where a passive vapor intrusion mitigation system is required.

6.6.3. Structural Loading. Design building structures for the following types of minimum site specific live loads per most recent versions of ASCE-7 and IBC.

6.6.3.1. Roof live loads – (20 psf)

6.6.3.2. Snow load – (pg – snow ground load – 10 psf)

6.6.3.3. Wind load – 95 mph

6.6.3.4. Seismic loading - Use applicable references. Seismic design also includes the various systems, piping, hangars, etc.

#### 6.7. THERMAL PERFORMANCE

No additional requirements.

## 6.8. PLUMBING

- 6.8.1. Reduce potable water use for building sewage conveyance by 50 percent through the use of water conserving or non-potable water fixtures. This can be accomplished through the implementation of high-efficiency and very high efficiency toilets, rainwater harvesting/use, sensing low flow and very-low flow faucets, and other appropriate technologies.
- 6.8.2. Non-Water Using Urinals – Install with urinal rim 17 inches AFF. Provide concealed chair carriers. If urinals use a replaceable cartridge, provide four (4) additional, long-life type cartridges for each urinal installed along with any tools necessary to remove/install cartridge, and an additional quart of biodegradable liquid for each urinal installed.
- 6.8.3. Wall hung water closets are not preferred. Tank type (6-liter) water closets are preferred.
- 6.8.4. Preferred sink is vanity with counter mounted lavatory.
- 6.8.5. Floor mounted water coolers are not preferred.
- 6.8.6. All fixtures shall be white and exposed fittings polished chrome.
- 6.8.7. Piping
- (a) Use plastic pipe (Sch 40 PVC) for drainage and venting including under concrete slabs or inside buildings.
  - (b) Do not use cellular foam core piping.
  - (c) Use CPVC and Type L (or above) copper for water supply above slabs.
  - (d) Use type K (copper) for water supply under slabs.
  - (e) Provide wall hydrants at a maximum spacing interval of 200 feet around the exterior wall of the building. Hydrant will be box type, freeze proof, with an integral vacuum breaker/backflow preventer.
  - (f) Elevator Sump Pump. Terminate waste discharge from elevator sump into the sanitary sewer system (where elevators are provided). Provide an oil separator to accept the waste discharge prior to emptying into the sanitary sewer system. When an "approved alarm system " is provided and installed, an oil separator is not required and as a minimum, the alarm should provide a local audible and visual alarm, and shall provide a remote indication to the Building UMCS or similar monitoring system.
- 6.8.8. Provide domestic hot water equipment that provides the best Life Cycle Cost Analysis (LCCA) and not limited to gas fired or electric hot water heater.

## 6.9. SITE ELECTRICAL AND TELECOMMUNICATIONS SYSTEMS

- 6.9.1. General. Site development work shall include selected exterior electrical demolition, construction of secondary service, communications service, Cable TV, as shown on the drawings and as described in the contract or task order.
- 6.9.2. Building Electrical Site Work and Coordination. Conduct electrical site coordination meetings at the start of design and when necessary thereafter. Meetings shall include government representatives (DPW and NEC), privatized electric utility company (Sandhills Utilities Services), the local cable TV company (Time-Warner) and all other utilities involved in the site work, and the Corps of Engineers Contracting Officers Representative.
- 6.9.3. Exterior Electrical Distribution System
- 6.9.3.1. Design and construct the site electrical secondary distribution. Coordinate with SUS through the Contracting Officer, regarding primary routing and transformer locations, sizes, and impedances. Use power and telecommunication poles only as a last resort when no other method is readily available.
- 6.9.3.2. Design and construct exterior circuits connected beyond the Meter for sump pumps, irrigation pumps and other electrical and mechanical equipment. Stand alone circuits should be beyond a meter and SUS end at the line side of the meter socket. .

6.9.3.3. Do not locate above ground distribution equipment within 33 feet of buildings, including transformers. Small pedestrian lights, less than 4" base diameter, are excluded from this requirement.

6.9.3.4. SUS will demolish any existing exterior SUS above ground equipment no longer required on project site. Any below ground demo will need to be negotiated due to depth and location of underground facilities.

6.9.3.5. All work done by SUS shall be under a separate contract with the Government. THIS WORK IS NOT PART OF THIS CONTRACT.

6.9.3.6. Low voltage secondary service ductlines shall be direct burial, thick wall type minimum. Concrete encase in vehicular traffic areas (including construction vehicular traffic areas).

6.9.3.7. Provide rigid galvanized steel conduit, for transitions from below to above grade. Fittings for steel conduit shall be steel threaded or compression type. Screw, clamp or other type fittings are not acceptable.

6.9.3.8. Provide secondary service cables to the secondary compartment of the transformer. The cables shall be clearly marked [color coded or taped] and sufficient of length to facilitate their connection to the secondary lugs of the transformer. SUS will install the cable terminators and connect to the transformer.

6.9.3.9. See Appendix C: UTILITY CONNECTIONS for additional information and requirements.

#### 6.9.4. Exterior Lighting

6.9.4.1. Lighting within the Old Post Historic District must meet the requirements of the Old Post Historic District Design Guidelines

6.9.4.2. Design the site lighting for installation by SUS (under separate contract). Supply the site design to SUS for them to plan installation of supporting conduits, exterior lighting bases, and other equipment.

6.9.4.3. See Appendix C: UTILITY CONNECTIONS for additional information and requirements.

#### 6.9.5. Site Telecommunications

6.9.5.1. Reference I3A Para 3.7.4.5. Connect to the OSP, extending a new duct line, maintenance hole and cable system to the building main communications room. Each ductline between maintenance holes shall be minimum 4-way 4-inch, Schedule 40 PVC conduits. Coordinate design, construction and connection point location with the installation NEC. Typical drawings required for design can be found in I3A figures C2 thru C6. Entrance ducts shall be a minimum of a 3-way 4-inch duct line to the building main communications room.

6.9.5.2. Do not use the last remaining duct in any pathway system/ductbank. Include one spare duct for maintenance purposes in any segment of pathway or duct bank design.

6.9.5.3. Coordinate planning and design of outside plant communications systems on Fort Bragg with the Fort Bragg NEC. NEC will provide the following information and assistance for the proposed communication design

(a) Location of nearest fiber optic service and available strand count

(b) Location of the nearest copper service and available cable count

(c) Location of nearest maintenance hole, hand hole, or installation cable support infrastructure that can provide a duct tie-in point.

6.9.5.4. When no existing outside plant communications infrastructure is available near the proposed facility, the following requirements apply:

(a) Provide outside plant communications infrastructure from the nearest Area Distribution Node (ADN) or Remote Switch Unit (RSU).

(b) Provide a 3-way 4-inch duct line to the building main communications room. Use one duct to place the copper service cable. Use the second duct to place the fiber optic service cable along with one 3", 3 cell fabric mesh innerduct. The remaining duct is a spare.



- 6.9.5.5. Reference to I3A Para 3.7.8. Use Fabric Mesh Innerduct for duct and cable installations. Install 3 each, 3 inch, 3 cell fabric mesh with each fiber cable installation and in one of four newly installed ducts.
- 6.9.5.6. Reference I3A Fig C-5. Maintenance holes shall be 38YJ4 and shall include a moveable ladder.
- 6.9.5.7. Reference I3A, paragraph 3.7.1.3 (a). Size 30" maintenance hole lids are required unless otherwise specified or approved. Maintenance hole lids larger than the standard 30" size are extremely cumbersome when providing maintenance on cable infrastructure.
- 6.9.5.8. Outside Plant (OSP) Voice and Fiber Optic Service Cables: Provide OSP Voice and Fiber building service cables as follows:
- (a) Extend all service cables through the new building service duct line.
  - (b) Terminate all OSP Voice Only service entrance cables on protected terminal blocks and all Fiber Optic cables on service entrance termination hardware located in the main communications room.
  - (c) Provide service entrance termination hardware for fiber optics service cables. Terminate the facility service data fiber optic cables on a patch panel, on 19-inch floor mounted standard racks. Terminate cables with 'SC' connectors at facility service entrance. Terminate the facility's data communication at an RJ45 patch panel in this rack. Provide patch cables (fiber and copper) and connect as required by NEC to meet I3A requirements.
  - (d) Demolish and remove any existing OSP cabling and communications duct bank no longer required on the project site.
- 6.9.6. Lightning Protection. Lightning risk assessment calculations shall be in accordance with NFPA 780, Appendix L, and other referenced criteria, utilizing the following variables:
- 6.9.6.1. Fort Bragg Lightning Flash Density Index "Ng" Value = 4
- 6.9.6.2. Determination of Environmental Coefficient Index "C1" = 1 (Isolated structure, no other structures located within a distance of 3H)
- 6.9.6.3. Determination of Structure Contents Coefficient Index "C3" Minimum value = 1 (Use larger if applicable)
- 6.9.6.4. Determination of Structural Occupancy Coefficient "C4" = 1 (Normally occupied)
- 6.9.6.5. Determination of Lightning Consequences Coefficient Index "C5" = 5 (Continuity of facility services required, no environmental impact).
- 6.9.6.6. Provide transient voltage surge protection.
- 6.10. FACILITY ELECTRICAL AND TELECOMMUNICATIONS SYSTEMS
- 6.10.1. Coordinate all work with Fort Bragg NEC.
- 6.10.2. Voice/Data Communications
- 6.10.2.1. LAN Hubs shall be Government Furnished/Government Installed.
- 6.10.2.2. Provide a quadplex power outlet and voice/data communications outlet every eight (8) feet of open wall space to support modular training in one classroom.
- 6.10.2.3. Reference the I3A Technical Criteria, paragraph 2.5.6. Cover no less than two walls with AC fire rated plywood.
- 6.10.2.4. Reference the I3A Technical Criteria, paragraph 2.3.3.1. Wire all copper outlets, patch panels, and connectors per T568A.

6.10.2.5. Use the following Cable Jacket and RJ-45 Color Code: Green - The standard wire and jack color for UNCLASSIFIED. Red - The standard wire and jack color for CLASSIFIED (SECRET). Yellow - The standard wire and jack color for CLASSIFIED (TOP SECRET).

6.10.2.6. Label in accordance with the Fort Bragg standard labeling scheme shown below:

6.10.3. Special Circuits – Fire Alarm and Utility Monitoring and Control Systems (UMCS).

6.10.3.1. Coordinate cabling and locations of demarcation points for all special circuits with DPW engineers or Emergency Services personnel for the associated discipline. Provide the premise cable design, installation and testing for all special circuits. Ft Bragg NEC responsibility for special circuit connectivity is at the Telecommunications Room only. Ft Bragg NEC is responsible for providing "IP" addresses for the special circuits along with any telecommunications room cross connects that will activate the circuit.

6.10.3.2. Terminate all special circuits to the first premise cable patch panel on ports 21-24, starting at 24 working in reverse. Label fire alarm circuits "FACP" and label Utility Monitoring & Control Systems circuits "UMCS".

6.10.4. SIPRNET (Where specifically applicable to Project – see paragraph 3)

6.10.4.1. The entire SIPRNET infrastructure including PDS, wiring, and equipment (except for the GFGI encrypted servers) installed under this contract (if applicable) shall meet the Technical Guide for Integration of SIPRNET version 5.0 as a Hardened Carrier PDS and the following requirements:

6.10.4.2. Mount Distribution Systems (PDS) lock boxes sixty seven (67) inches above the finished floor in all private offices, unless otherwise allowed in designated Controlled Access Areas (CAA) areas.

6.10.4.3. Submit all PDS design and material data sheets to the NEC for approval, prior to procurement or installation to save from costly revisions or change orders. Design the PDS in strict compliance with the national security criteria.

6.10.4.4. Install a Holocom, Wiremold/Legrand or other Central TEMPEST Technical Authority (CTTA) approved expandable type PDS System. The PDS System attributes shall include an interlocking "clam-shell" design that enhances security and flexibility in that it can be securely closed and locked, and then re-opened for security inspections and network changes or enhancements. The PDS must also include an electrostatic powder coating, which provides an aesthetically pleasing appearance.

Per national security references, each agency, service, or organization is afforded interpretation and approval authority, by the Designated Approving Authority (DAA), per the respective manual when assessing any PDS design and installation methodology.

6.10.5. System Furniture:

Reference I3A paragraph 2.3.5.3. Ensure that telecommunication and power are installed in channels designed for such purpose. Do not install cables in panel gaps or interstitial space. Connect the furniture to the building cabling infrastructure through a ceiling mounted power pole, a wall mounted junction box (j-box) or underneath via a raised floor system and then channeled through the furniture. Do not expose cables between j-boxes and the furniture. Contain cables in flexible conduit. SIPRNET, if installed, shall enter through its own power pole system and channeled through an approved PDS. This configuration should provide all separation necessary to comply with TEMPEST requirements.

6.10.6. Elevators

Install conduit, wiring, and a telephone device as the emergency phone in the elevator cab. Government is responsible for making telephone operable including coordinating with the Ft Bragg NEC for service and connection to the Ft Bragg DES 911 Emergency Call Center.

6.10.7. Cable television (CATV).

Provide CATV in all private offices, conference, and classrooms. The cable television system shall consist of cabling, pathways, and outlets. All building CATV systems shall conform to APPLICABLE CRITERIA to include I3A criteria.

#### 6.11. HEATING, VENTILATING, AND AIR CONDITIONING

6.11.1. The existing UMCS is an LCS-8520 that utilizes the LonWorks® Technology to integrate LNS databases into a single front-end. The UMCS is based on UFGS 25-10-10.

6.11.1.1. Fort Bragg's System Integration (SI) Contractor will integrate the building's BAS in accordance with UFGS 25-10-10 and the Fort Bragg UMCS Integration SOW, under separate contract with the Government. Coordinate through Fort Bragg's UMCS System Manager.

##### 6.11.1.2. General Requirements

(a) Do not modify the chiller microprocessor supplied with the equipment. Control and safety functions should be the chiller manufacture's responsibility.

(b) Do not modify the boiler microprocessor supplied with the equipment. Control and safety functions should be the chiller manufacture's responsibility. If heating water systems are used, then design such systems to maintain the boiler manufacture's minimum temperature when in operation but vary the heating water supply temperature as required to meet the buildings requirements.

(c) Provide all DDC software, equipment and devices from a single common manufacturer whenever possible.

##### 6.11.2. Mechanical Equipment Maintenance and Accessibility Requirements

6.11.2.1. Selected mechanical systems must be compatible with the existing systems and composed of standard commercially available items with readily available service and repair parts.

6.11.2.2. Any mechanical rooms above the first floor shall have an external access (door, removable louvers, etc of ample size such that the largest piece of installed equipment could be removed through the opening.

6.11.2.3. Install all piping, except individual fixture pipes, to permit equipment access without requiring removal of permanent walls, floor, or ceilings.

6.11.2.4. Arrange all equipment, piping, etc in mechanical rooms so that each piece of equipment can be removed without having to remove any other piece of equipment. Consider things such as coil pull areas in the mechanical room layouts.

6.11.2.5. Chillers: Chillers shall include as a minimum the following features

(a) Scroll or screw type compressors with 5-year parts warranty

(b) Microprocessor controllers with self-diagnostic capabilities

(c) Low ambient controls to zero (0) degrees F.

##### 6.11.2.6. Fuels

Natural gas is the preferred fuel source for heating.

##### 6.11.2.7. Pumps

(a) Hot Water and Chilled Water pumps shall operate at 1,750 rpm or less

(b) Mechanical Rooms: Heat to 40 F for freeze protection where piping may be subject to freezing.

6.11.3. Site Mechanical Equipment. Design all exterior mechanical equipment to be compatible with existing mechanical equipment within the surrounding area. This includes color and screening.

#### 6.12. ENERGY CONSERVATION

6.12.1. Inclusion of Renewable Energy Features. The following renewable energy features have been determined lifecycle cost effective, are included in the project budget and shall be provided:

NONE IDENTIFIED.

#### 6.13. FIRE PROTECTION

6.13.1. Provide fire extinguisher cabinets and brackets when fire extinguishers are required by UFC 3-600-01 and NFPA 101. Place cabinets and brackets shall in accordance with NFPA 10.

6.13.2. Provide semi-recessed cabinets in finished areas and brackets in non-finished areas (such as utility rooms, storage rooms, shops and vehicle bays).

6.13.3. Fire Extinguishers are Government Furnished/Government Installed for this project. Advise Government of required size and type Fire Extinguisher for each type building and service location

6.13.4. Fire Alarm System. Fire alarm panels must be addressable and must be able to communicate alarms to the Honeywell Enterprise Building Integrator System (EBI) located at the Fort Bragg 911 Center. Coordinate fire alarm zone descriptions and number with the fire department. (Single-story buildings typically require a minimum of 8 to 11 fire alarm zones; each floor above the first floor requires an additional 6 fire alarm zones.) Manual pull stations shall be metal, double action type, and shall not use break rods.

#### 6.13.5. Mass Notification System

6.13.5.1. Provide a combined system that performs both as an individual building MNS and as the building Fire Alarm voice evacuation system. The MNS shall communicate with the base wide system. The base wide system is by Federal Signal and communication is by wireless transmission.

6.13.5.2. In addition to the applicable references and design criteria in paragraphs 4 and 5, see Appendix F for Fort Bragg Implementation Directions to Building Mass Notifications Specifications and Installation Guidelines

#### 6.14. SUSTAINABLE DESIGN

6.14.1. LEED Rating Tool Version. This project shall be executed using LEED-NC Version 2.2.

6.14.2. The minimum requirement for this project is to achieve LEED Silver level. Each non-exempt facility (building plus sitework) must achieve this level. In addition to any facilities indicated as exempt in paragraph 3, the following facilities are exempt from the minimum LEED achievement requirement: Organizational Storage Building, POL Storage Building and Hazardous Waste Storage Building are exempt from the requirement to achieve LEED Silver certification. See paragraph Additional Sustainable Information..

6.14.3. Credit Validation: LEED registration, compiling of documentation at LEED OnLine and use of the LEED Letter Templates is required. Registration and payment of registration fees will be by the Government. Administration/team management of the online project will be by the Contractor. Validation of credits will be accomplished by the Government. LEED certification of the project by the Contractor is required. The Contractor will obtain LEED certification prior to project closeout. Application, payment of certification of fees and all coordination with USGBC during the certification process will be by the Contractor. GBCI interim review of design phase data is not required by the Government but is recommended. Government validation during project execution does not relieve or modify in any way the Contractor's responsibility to satisfy all requirements for certification as defined by LEED and GBCI. Contractor is not responsible for design phase LEED documentation of any unaltered portion of the design that is accomplished by others. If the project includes unaltered complete design by others, during the certification process Contractor will coordinate all GBCI comments on LEED credits that fall outside Contractor's scope of responsibility with the Government for coordination with the Designer of Record, and Contractor will not be penalized if project fails to achieve certification at the minimum required level due to loss of credits that are the responsibility of others.

6.14.4. Commissioning: See Appendix M for Owner's Project Requirements document(s).

6.14.5. LEED Credits Coordination. The following information is provided relative to Sustainable Sites and other credits.

**SS Credit 1 Site Selection:**

Project site IS NOT considered prime farmland.

Delineation of 100-year flood elevation is shown on site drawings provided in this CONTRACT.

Project site contains no habitat for threatened or endangered species.

No portion of project site lies within 100 feet of any water, wetlands or areas of special concern.

Project site WAS NOT previously used as public parkland.

**SS Credit 2 Development Density & Community Connectivity.**

Project site DOES NOT meets the criteria for this credit.

**SS Credit 3 Brownfield Redevelopment.**

Project site DOES NOT meets the criteria for this credit.

**SS Credit 4.1 Public Transportation Access.**

Project site DOES NOT meets the criteria for this credit.

**EA Credit 6 Green Power.**

35% of the project's electricity WILL NOT will be provided through an Installation renewable energy contract. Do not purchase Renewable Energy Credits (REC's) to earn this credit.

**MR Credit 2 Construction Waste Management.**

The Installation has an on-post recycling facility.

6.14.6. LEED Credit Preferences, Guidance and Resources. See Appendix L LEED Project Credit Guidance for supplemental information relating to individual credits.

6.14.7. Not Used

6.14.8. For all Fort Bragg projects using LEED Online, invite [thomas.s.blue@us.army.mil](mailto:thomas.s.blue@us.army.mil) to join the LEED online project at beginning of project. No team assignment is needed once he joins, as he is a reviewer.

6.14.8.1. Additional Information

Project has been registered under Version 2.2 by the Government. Project administration will be transferred to Contractor after award.

**6.15. ENVIRONMENTAL**

6.15.1. Spill Response Procedure and Plan

6.15.1.1. Notify the Fire Department immediately in the event of a hazardous spill. The first person on-scene that identifies the hazard must notify the Fire Department – this may or may not be the designated POC.

6.15.1.2. After notifying the Fire Department, call the DPW Environmental Compliance Branch and the Contracting Officer.

6.15.1.3. The Fort Bragg Fire Department and DPW Environmental Compliance Branch are responsible for any off-installation notification.

6.15.1.4. Provide a Spill Response Plan for review. Include a list of reporting channels, telephone numbers, a listing of the hazardous materials stored on site, copies of Material Safety Data Sheets for the hazardous materials, and a site diagram outlining where the storage sites are located. Train all supervisors on site in the execution of the Spill Plan. Document all training.

#### 6.15.2. Wetlands and Stream Crossing

6.15.2.1. Do not enter, disturb, or allow any discharge (soil, sediment, and/or pollutants) into any wetlands.

6.15.2.2. Comply with all local, state, and federal laws and regulations pertaining to the protection of wetlands under the CWA Section 404/401 regulatory program and North Carolina DENR Division of Water Quality.

6.15.2.3. If wetland impacts are unavoidable, abide by CWA Section 404 regulatory program and apply for applicable wetland permits. All wetland permit costs, delineations, and compensatory mitigation costs will be the contractor's responsibility.

6.15.2.4. Comply with avoidance, minimization strategies prior to approval of any wetland impact in accordance with CWA Section 404 (CWA 33 USC 1344).

6.15.2.5. All stream crossings will avoid impacts to navigable waters and wetlands. Do not enter, disturb, destroy, or allow discharge (fill) of soil, sediment, or contaminants into the stream.

6.15.2.6. Comply with all local, State, and Federal laws and regulations pertaining to the protection of surface waters to include but not limited to lakes, ponds, streams, creeks, rivers, and bayous.

#### 6.15.3. Safety and Health Requirements for Construction Activities

6.15.3.1. Work performed under this contract shall comply with EM 385-1-1, specifically 28.A, applicable Federal, State, and local safety and occupational health laws and regulations. This includes, but is not limited to, Occupational Safety and Health Administration (OSHA) standards, CFR 29 Part 1910, especially Section .120, "Hazardous Waste Site Operations and Emergency Response" and CFR 29 Part 1926, especially Section .65, "Hazardous Waste Site Operations and Emergency Response". Submit matters of interpretation of standards to the appropriate administrative agency for resolution before starting work. Where the requirements of this contract, applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements shall apply.

6.15.3.2. Ensure that all subsurface disturbing activities are monitored by a competent person using a direct reading instrument capable of detecting any VOCs that may be released.

6.15.3.3. Develop a Site Safety and Health Plan (SSHP) to cover the safety and health aspects of the subsurface contamination detailed in Section 6.12.1, which may be encountered during the execution of this project. In some areas the Contractor may encounter contaminated groundwater which may need to be dewatered to execute construction activities. Although the contamination is in the soil, VOC vapors may also be released during excavation of footers, utility trenches, and other subsurface disturbing activities.

6.15.3.4. The Savannah District Safety and Occupational Health Office are required to review and accept the Site Safety and Health Plan. In addition to the requirements detailed in 385-1-1 28.A, submit the following as part of the SSHP: Certifications of Hazard Waste Site Training and Experience, Medical Clearances, and Licenses. Do not submit materials with full social security numbers or personal medical data. Black out this information.

#### 6.15.4. Dewatering

6.15.4.1. If dewatering of excavations is required, the water being removed shall be considered as contaminated with SVOCs and/or VOCs.

- 6.15.4.2. Fort Bragg Directorate of Public Works Environmental Compliance Branch (DPW-ECB) and Water Management Branch (WMB) must approve the specific structural stormwater management measures.
- 6.15.4.3. All stormwater management requirements apply to dewatering activities, materials, and water. All OSHA health and safety requirements apply to dewatering activities.
- 6.15.5. Not used.
- 6.15.6. Existing Monitoring Wells
- 6.15.6.1. Should any wells be damaged, or found to be placed in an area where they will become damaged, contact the USACE project manager for directions on how to close and where to re-install the wells. Close and reinstall GW monitoring wells at no additional cost to the Government. For further information, reference Fort Bragg's Standing Operating Procedure (SOP) #6003.
- 6.15.6.2. Protect all groundwater monitoring wells at construction sites with known contaminated areas.
- 6.15.6.3. Raise the tops of or lower existing monitoring wells located in pavements and sidewalks to meet new finished grades and replace the tops with vehicle rated tops.
- 6.15.6.4. Relocate ground-water monitoring wells located within building footprints only after written approval from the State and the Contracting Officer.
- 6.15.6.5. Repair or replace any monitoring wells damaged as a result of construction at the Contractor's expense.
- 6.15.7. Contractor Generated Spills
- (a) Manage, store, dispose and dispense petroleum products, hazardous materials, and hazardous wastes according to all Federal, state, and local regulations (including Fort Bragg Regulations 200-1, 200-2, and 200-3).
- (b) Transport generated hazardous waste off Government property to a permitted transportation, storage, and disposal facility (TSDF).
- (c) Coordinate with the DPW Environmental Compliance Branch Hazardous Waste Program Manager to obtain the EPA ID number for the standard manifest. Hazardous waste cannot leave the installation without the designated representative from the DPW Environmental Office signing and obtaining a copy of the manifest.
- 6.15.8. Historic Properties. Inadvertent Discovery of Cultural Material. If any artifacts or objects related to cultural resources become evident during construction or construction-related activity, stop ground disturbing activities immediately and notify the Contracting Officer and the Fort Bragg Cultural Resources Program Manager at 910-396-6680. Cultural resource objects or artifacts include but are not limited to: bone, shell, stone tools, ceramics, bottle glass as well as metal objects relating to any time period before 1950 but excluding post-1940 military training debris (e.g. shell casings, shrapnel, wire etc).
- 6.16. PERMITS
- 6.16.1. The Government has not obtained any permits/licenses related to this project.
- 6.16.2. Obtain ALL applicable permits as part of the design process and secure ALL permits necessary for construction of the project. Determine fee basis and pay all filing fees at no additional cost to the Government.
- 6.16.3. Comply with provisions of the Installation permits, compliance agreements, plans with regulating authorities/agencies.
- 6.16.4. Submit copies of permits to the Contracting Officer and Ft Bragg Environmental Division in sufficient time to allow for review and revision with ultimate submittal 10 days prior for the associated permitted activity. Provide copies of permit amendments to the Contracting Officer representative and Ft Bragg Environmental Division.

- 6.16.5. Erosion and Sediment control ((E&SC) Permit: After issuance by , NC DENR Department of Water Quality (DWQ), changes to the issued permit are prohibited.
- 6.16.6. Water and Sanitary Sewer Permit. ONUS, as the Fort Bragg water and sewer privatization contractor, is responsible for all aspects of obtaining and closing the potable water and sanitary sewer permits for this project.
- 6.16.7. Borrow Pit Permit. A permit is required to use the Fort Bragg soil borrow material pits. Process soil borrow pit permits with the Environmental Branch of the Directorate of Public Works Environmental Sustainment Division through the Contracting Officer Representative.
- (a) Permits are issued for the life of the contract only.
  - (b) Borrow material may only be used on the project for which the permit(s) are issued.
  - (c) Keep a copy of the signed permit with the borrow hauling vehicle throughout the borrow operation period.
  - (d) Copies of the borrow permit can be found in Appendix DD.
- 6.16.8. Construction and Demolition (C&D) Waste
- 6.16.8.1. Obtain and pay for all permits associated with demolition.
- 6.16.8.2. Landfill tipping fees for construction debris WILL NOT be charged to the Contractor at time of award contract. If applicable, the landfill tipping fees are identified in Appendix CC.
- 6.16.8.3. Construction and Demolition (C&D) permit is required to use the Fort Bragg LaMont Road Construction and Demolition Landfill Facility (Permit No 26-08). Follow requirements identified at <http://www.bragg.army.mil/envbr/solidwaste.aspx> regarding disposal of inert construction and demolition waste in the Ft Bragg C& D landfill sites.
- (a) Process the Construction and Demolition (C&D) permit with the Environmental Branch of the Directorate of Public Works Environmental Sustainment Division through the Contracting Officer Representative.
  - (b) Permits are issued for the life of the contract only.
  - (c) Only materials produced on the project for which the permit(s) are issued may be disposed of in the land clearing and inert debris/demolition landfills.
  - (d) Keep a copy of the signed permit with the hauling vehicle(s) throughout the borrow operation period.
  - (e) Copies of the disposal permit can be found in Appendix CC.
  - (f) Obtain and pay for all permits associated with demolition.
  - (g) The contractor is encouraged to recycle commodities through the Ft. Bragg QRP.
- 6.16.9. Fort Bragg Excavation (Dig) Permits
- 6.16.9.1. Present an Excavation Permit, FB Form 1605, to the Resident Engineer for approval by the Facilities Engineer prior to any excavation that penetrates the ground by 6 or more inches. A sample of this form is included at Appendix HH or can be obtained from the Resident Office upon request.
- 6.16.9.2. Spot all utility lines using an independent spotting service prior to beginning excavation. Keep a signed copy of the digging permit on site at all times. Fort Bragg may conduct back check spotting excavation during the excavation portion of this contract.
- 6.16.10. Title V Air Permits
- 6.16.10.1. Coordinate with Fort Bragg's Environmental Branch, point-of-contact (POC) Gary Cullen (910-432-8464), Air Program Manager, in obtaining all required and applicable permits as part of the design process. Secure all permits necessary for construction of this project to include the purchase of any add-on emission control devices (if applicable) associated with this project, and at no additional cost to the Government.



6.16.10.2. Fort Bragg operates under a Title V Air Permit for air quality requirements. Perform a regulatory review of all air sources in the project and submit for approval to the Environmental Compliance Branch (ECB).

- (a) New sources must be reviewed for Prevention of Significant Deterioration (PSD) applicability. Each Congressional Appropriation is defined as one project. Additionally, new sources must be reviewed for NESHAP (National Emissions Standards for Hazardous Air Pollutants) applicability.
- (b) Develop required air permit application(s) and/or coordinate with ECB on any on-going permit applications.
- (c) Pay all Air Permitting fees to NCDENR (North Carolina Department of Environment and Natural Resources). Obtain all required permits prior to construction of any new sources.
- (d) Comply with all State regulatory requirements for boilers fired by either natural gas or distillate oil. Ensure that the boiler(s) is included in the Installations Title V Air Permit.
- (e) New boilers with input greater than 10 million BTU/hr shall meet 40 CFR Part 60, New Source Performance Standards.
- (f) All new boilers shall include low NOx burners.
- (g) Obtain an air permit for each type of material (i.e. concrete, rock crushing, and asphalt batch plants) that will produce dust and other harmful particulates within the boundaries of the installation.
- (h) The Contractor may not unilaterally change the Installation's Title V Air Permit. Coordinate any and all changes/modifications through the designated Environmental Branch staff.

6.16.10.3. Air Permit Submittal Requirements (Boilers and Domestic Water Heaters). Pursuant to satisfying requirements under the Clean Air Act, at or before the 60 percent design stage, submit the following to the installation's environmental office, point-of-contact (POC) Gary Cullen , Air Program Manager:

- (a) A listing of boilers and domestic hot water heaters that will be fired by natural gas, propane, and/or fuel oil
- (b) The fuel or fuels (primary and backup, if applicable) that will be utilized for each piece of equipment
- (c) The quantity of each particular size
- (d) The respective input firing rate.
- (e) Provide a point of contact and an alternate point of contact, should the environmental office require additional information from the designer of record during the permitting process.
- (f) Send two copies of the document to the Savannah District: one to the Project Manager for placement in Central Files, and another to the Mechanical Section.

6.16.10.4. Document Changes

- (a) Do not send the Air Permit prematurely, since any increase in boiler sizing subsequent to submission of the document will require revision to the permitting process,
- (b) If there is a change in equipment sizing during refinement of the design process, submit an updated copy of said document.

6.16.10.5. Incorporate the equipment accessories required for compliance with the governing environmental laws into the design. This includes, but is not limited to, determining the need for individual metering and the level of emissions monitoring required.

6.16.10.6. The interim design narrative shall specifically address those features that will be incorporated into the boiler system design to assure compliance with the applicable environmental laws of the State.

6.16.10.7. Normally, for fast track design-build contracts, the Air Permit construction permit will not have been obtained prior to award of the design-build contract.

- (a) No construction associated with the building(s) housing the boiler(s) or other source(s) of contaminant can be done prior to obtaining the required permit.
- (b) The following things can be done prior to possession of the permit: clearing and grading, access roads, driveways, parking lots, underground utilities up to the 5-foot line of the buildings, and ancillary structures (structures not associated with housing the sources of contaminants).

6.16.10.8. If the use of temporary rental or leased equipment is required during demolition, renovation, or construction of the project, the emissions from those pieces of equipment need to be qualitatively and quantitatively reviewed for air quality permitting requirements.

(a) Assess those needs and any permitting required will be the responsibility of the contractor.

(b) Contractor is responsible for any permitting fees or resulting permit compliance associated with the temporary equipment. Examples include the use of temporary electrical generators, boilers, painting operations, abrasive blasting operations etc. to support the project. Per 15A NCAC 2D .0300

6.16.11. State of North Carolina Required Applications and Permits. Prepare, sign, and submit the following list of commonly required State of North Carolina applications and permits for Fort Bragg projects

6.16.11.1. North Carolina State Demolition Permits

6.16.11.2. North Carolina State Asbestos Removal Permit

Required.

6.16.11.3. North Carolina Erosion and Sedimentation Control Permit. Create and implement an Erosion and Sedimentation Control (ESC) Plan that conforms to the Fort Bragg EPA Construction General Permit, and local erosion and sedimentation control standards/ codes in effect at the time of award.

6.16.11.4. North Carolina General Permit to Discharge Stormwater under the National Pollutant Discharge Elimination System

6.16.11.5. North Carolina Stormwater Management Permit Application Form

6.16.11.6. North Carolina Notice of Intent (NOI) and Notice of Termination (NOT) Documents. Prepare, sign, and submit the NOI and NOT documents to the State of North Carolina.

6.16.11.7. Obtain any North Carolina additional applications and permits not listed as required for the construction of this project.

## 6.17. DEMOLITION

6.17.1. The Government will identify buildings and other existing features to be demolished in the site plans, as applicable to the project. Demolish building(s) and other demolition work within the construction footprint to include demolition, asbestos containing materials (ACM) abatement and hazardous building materials (HBM) removal, removal of foundations, capping underground utilities (water, sewer, natural gas, heating and chilled water, etc.) and other site improvements. Comply with Federal, State and local statutes, ordinances agreements and as described in this RFP.

(a) The Contractor IS NOT authorized to perform a full remediation of the site under this Contract.

6.17.2. Copies of ACM and HBM surveys are included in the RFP in Appendix AA, where applicable to the project.

6.17.3. The construction and waste management plan shall identify the materials to be diverted from disposal and sorted onsite.

6.17.4. In the case of buildings that are in the direct footprint of the project, the Government will move demolition building occupants and furnishings prior to the Contract NTP date except where movement is not in the best interests of the Government. Such cases will be identified in the Contract.

6.17.5. Notify Directorate of Public Works (DPW) through service orders (Telephone 910-396-0321) to disconnect all utilities to demolition buildings to include electricity, natural gas, propane gas, and fuel oil.

6.17.6. Demolition of potable or fire water mains and lines or sanitary sewer mains and lines.

ONUS under separate contract with the Government will disconnect, cap and/or demolish water and sewer mains and/or lines. Utility cost outside the five foot line are not a part of this contract.

6.17.7. If the Contractor plans to use a demolition building for administrative or storage:

6.17.7.1. Notify the Government through the Corps of Engineers in writing of their intent during contract negotiations.

6.17.7.2. DPW will disconnect utility services, but not remove them.

6.17.7.3. The Contractor is responsible for installing appropriate electrical, water, and gas meters for the building. If connecting to privatized utility (water, gas, or sewer), contractor must coordinated with privatized utility company for installation of services. All costs associated with the connection shall be paid for by the contractor

6.17.7.4. DPW will reconnect the metered services upon notification by Corps of Engineers.

6.17.7.5. The government bears no responsibility for the condition of the demolition buildings between the Request for Proposal (RFP) and the contract or task order Notice to Proceed (NTP) date.

6.17.7.6. The Government maintains the right to salvage all materials from the building until the NTP date.

6.17.8. Assume that all demolition buildings will have no salvage value.

6.17.9. Do not assume that any building within the project footprint can be an administrative or storage building. If a building is missing structural components (windows, doors, etc), equipment (commodes, sinks, HVAC units, etc) or utilities (electricity, water, natural gas, fuel oil), it is the Contractor's responsibility to restore these components to make the building habitable for their use.

6.17.10. DPW will notify NEC to disconnect government telephone and CATV service to buildings.

6.17.11. DPW will notify CENTURYLINK / Time Warner to disconnect privately owned telephone and CATV service to buildings.

6.17.12. Fort Bragg DPW charges three hundred dollars (\$300.00) per building to disconnect utilities.

6.17.13. Fill depressions caused by the removal of demolished materials such as building foundations, pavements, sidewalks, utility lines and pad, etc., to grade, compacted per soil compaction requirements, and slope to drain towards the nearest appropriate structural stormwater management measure.

6.17.14. If fuel contaminated soils are found during the demolition or cut/fill operations, cease work immediately and notify either the Contracting Officer representative or the Contracting Officer for resolution that can include removal of contaminated soil, filling and capping area with clean, uncontaminated soil.

6.17.15. Asbestos/Hazardous Material Removal

6.17.15.1. The Contracting Officer representative will provide copies of all asbestos inspection reports, permits and disposal documents and Asbestos Removal, Transportation, and Disposal Documentation Forms to the ECB Asbestos Program Manager. North Carolina accredited personnel must perform all asbestos activities.

6.17.15.2. Dispose of all abated ACM in accordance with all Federal, State, and local regulations at the Fort Bragg Landfill on LaMont Road.

6.17.15.3. If asbestos/ lead based paint/ hazardous materials are positively identified during building or site demolition, cease work immediately and notify either the Contracting Officer representative or the Contracting Officer for resolution.

6.17.16. Utility Demolition

- 6.17.16.1. Coordinate with the privatized electrical company (Sandhills Utilities Services), privatized water/sewer company (Old North Utility Service), Directorate of Information Management, and Directorate of Public Works during design phase and before construction.
- 6.17.16.2. Completely remove and cap existing utilities located beneath new building footprints (if abandoned) or reroute if utilities are being used by existing buildings. Coordinate demolition of existing utilities serving occupied buildings with construction of new utilities so that utilities to occupied buildings remain in service at all times.
- 6.17.17. AST/UST Demolition
- 6.17.17.1. The project area may be located in a UNKNOWN contaminated area. Typical contamination constituents are from former heating oil and diesel underground storage tanks (USTs). Other sources of soil and groundwater contamination are old unlined dump sites and aboveground storage tank (AST) spill sites.
- 6.17.17.2. The location of USTs removed by others is provided to the Contractor as "Information Only", and may not be complete. If an unknown underground storage tank is discovered during construction, please adhere to Appendix MM. If an unknown tank meets the criteria for a Differing Site Condition under said contract clause, the clause provides an equitable adjustment for increased costs and/or delays associated with discovery and removal.
- 6.17.17.3. Remove and dispose of Underground Storage Tanks (UST) identified as "closed in place". Remove and dispose of tanks and all remaining appurtenances, preferably, at a recycling center.
- 6.17.17.4. Fort Bragg requires that all tanks have a closure report stating the size, condition, and final disposition of the tank.
- 6.17.17.5. Non-leaking heating tanks are not regulated by the State of North Carolina. However, should it be discovered that there were leaks or that free product is present, complete and submit to the Contracting Officer a closure report that is in accordance with North Carolina regulations.
- 6.17.17.6. Although the Government will furnish all site investigations and reports documenting project area contamination, the possibility exists that soils with previously-unknown contamination may be discovered. Appendix MME addresses this situation.
- 6.17.17.7. Pump out and dispose of any free product/sediment that is in the tank and remove up to 140 cubic yards of contaminated soil per UST. All fill must be clean and replaced to grade. Clean fill is defined as any soil removed from the excavation that is less than 10 pap (North Carolina UST action level).
- 6.17.17.8. Where applicable, remove Above Ground Storage Tanks (AST) and deliver to DPW for re-issue. Contact DPW to arrange for removal of any fuel that may be remaining in the tank. Render the tank safely inert for explosive hazard prior to removal. Address inerting and moving procedures as an Appendix in the Accident Prevention Plan. Up to 10 cubic yards of contaminated soil can be removed from an AST site.
- 6.17.17.9. Dispose of all contaminated soils and contaminated wash waters at a licensed facility.
- 6.17.17.10. Remove all contaminated soils and wash waters within 15 days of stockpiling.
- 6.17.17.11. Secure contaminated soils and prevent run-off by adequate containment practices. The Contractor is responsible for any surface contamination caused by inadequate site protection.
- 6.17.17.12. Provide Disposal receipts to the Contracting Officer Representative within 10 days of removal from the site.
- 6.17.18. Demolition Material Disposal. Contractor See Appendix CC for information on disposing of demolition materials in Fort Bragg's Landfill.
- 6.18. ADDITIONAL FACILITIES

This project includes the abatement and demolition of the following buildings; asbestos and hazardous material reports are included in Appendix AA:

A- 3229

A-3527

A-3726

A-3728

A-3732

A-3734

A-3736

A-4638

End of Section 01 10 00

**SECTION 01 32 01.00 10**  
**PROJECT SCHEDULE**

**1.0 GENERAL**

1.1. REFERENCES

1.2. QUALIFICATION

**2.0 PRODUCTS (NOT APPLICABLE)**

**3.0 EXECUTION**

3.1. GENERAL REQUIREMENTS

3.2. BASIS FOR PAYMENT AND COST LOADING

3.3. PROJECT SCHEDULE DETAILED REQUIREMENTS

3.4. PROJECT SCHEDULE SUBMISSIONS

3.5. SUBMISSION REQUIREMENTS

3.6. PERIODIC SCHEDULE UPDATE MEETINGS

3.7. REQUESTS FOR TIME EXTENSIONS

3.8. DIRECTED CHANGES

3.9. WEEKLY PROGRESS MEETINGS

3.10. OWNERSHIP OF FLOAT

3.11. TRANSFER OF SCHEDULE DATA INTO RMS/QCS

## 1.0 GENERAL

### 1.1. REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

- U.S. ARMY CORPS OF ENGINEERS (USACE) ER 1-1-11 (1995) Progress, Schedules, and Network Analysis Systems <http://www.usace.army.mil/publications/eng-regs/er1-1-11/entire.pdf>

### 1.2. QUALIFICATIONS

Designate an authorized representative who shall be responsible for the preparation of the schedule and all required updating (statusing) and preparation of reports. The authorized representative shall be experienced in scheduling projects similar in nature to this project and shall be experienced in the use of the scheduling software that meets the requirements of this specification.

## 2.0 PRODUCTS (Not Applicable)

## 3.0 EXECUTION

### 3.1. GENERAL REQUIREMENTS

3.1.1. Submit a project schedule as specified herein for approval showing the sequence in which the Contractor proposes to perform the work and dates on which the Contractor contemplates starting and completing all schedule activities. The scheduling of the entire project, including the design and construction sequences is required. Contractor management personnel shall actively participate in its development. Designers, subcontractors and suppliers working on the project shall also contribute in developing an accurate project schedule. The schedule must be a forward planning as well as a project monitoring tool. The approved project schedule shall be used to measure the progress of the work and to aid in evaluating requests for excusable time extensions. The schedule shall be cost loaded and activity coded as specified herein. The schedule will provide the basis for all progress payments. If the Contractor fails to submit any schedule within the time prescribed, the Contracting Officer may withhold approval of progress payments until the Contractor submits the required schedule

3.1.2. Status the schedule on at least a monthly basis, as specified herein. If in the opinion of the Contracting Officer, the Contractor falls behind the approved schedule, the Contractor shall take steps necessary to improve its progress including those that may be required by the Contracting Officer, without additional cost to the Government. In this circumstance, the Contracting Officer may require the Contractor to increase the number of shifts, overtime operations, days of work, and/or the amount of construction plant, and to submit for approval any supplementary schedule or schedules as the Contracting Officer deems necessary to demonstrate how the approved rate of progress will be regained. See paragraph 3.7.4.

3.1.3. Failure of the Contractor to comply with the requirements of the Contracting Officer shall be grounds for a determination by the Contracting Officer that the Contractor is not prosecuting the work with sufficient diligence to ensure completion within the time specified in the contract. Upon making this determination, the Contracting Officer may terminate the Contractor's right to proceed with the work, or any separable part of it, in accordance with the default terms of the contract.

### 3.2. BASIS FOR PAYMENT AND COST LOADING

The schedule shall be the basis for determining contract earnings during each update period and therefore the amount of each progress payment. Lack of an approved schedule update or qualified scheduling personnel will result in an inability of the Contracting Officer to evaluate contract earned value for the purposes of payment. Failure of the Contractor to provide all information, as specified herein will result in the disapproval of the preliminary, initial and subsequent schedule updates. In the event schedule revisions are directed by the Contracting Officer and those revisions have not been included in subsequent revisions or updates, the Contracting Officer may hold retainage up to the maximum allowed by contract, each payment period, until such revisions to the project schedule have been made. Activity cost loading shall be reasonable as determined by the Contracting Officer. The aggregate value of all activities coded to a contract CLIN as specified herein shall equal the value of the CLIN on the Schedule.

### 3.3. PROJECT SCHEDULE DETAILED REQUIREMENTS

The computer software system utilized to produce and update the project schedule shall be capable of meeting all requirements of this specification. Failure of the Contractor to meet the requirements of this specification will result in the disapproval of the schedule. Scheduling software that meets the activity coding structure defined in the Standard Data Exchange Format (SDEF) in ER-1-1-11(1995) referenced herein are Primavera Project Planner (P3) by Primavera, and Open Plan by Deltek.

#### 3.3.1. Use of the Critical Path Method

Use the Critical Path Method (CPM) of network calculation to generate the project schedule. Prepare the project schedule using the Precedence Diagram Method (PDM).

#### 3.3.2. Level of Detail Required

Develop the project schedule to an appropriate level of detail. Failure to develop the project schedule to an appropriate level of detail, as determined by the Contracting Officer, will result in its disapproval. The Contracting Officer will consider, but is not limited to, the following characteristics and requirements to determine appropriate level of detail:

##### 3.3.2.1. Activity Durations

Reasonable activity durations are those that allow the progress of ongoing activities to be accurately determined between update periods. Less than 2 percent of all non-procurement activities shall have Original Durations (OD) greater than 20 work days or 30 calendar days. Procurement activities are defined herein.

##### 3.3.2.2. Design and Permit Activities

Include design and permit activities, including necessary conferences and follow-up actions and design package submission activities. Include the design schedule in the project schedule, showing the sequence of events involved in carrying out the project design tasks within the specific contract period. This shall be at a detailed level of scheduling sufficient to identify all major design tasks, including those that control the flow of work. Include review and correction periods associated with each item.

##### 3.3.2.3. Procurement Activities

Include activities associated with the submittal, approval, procurement, fabrication and delivery of long lead materials, equipment, fabricated assemblies and supplies. Long lead procurement activities are those with an anticipated procurement sequence of over 90 calendar days. A typical procurement sequence includes the string of activities: submit, approve/review, procure, fabricate, and deliver.

##### 3.3.2.4. Mandatory Tasks

Include and properly schedule the following tasks (See also the Sample Preliminary Submittal Register Input Form):

- 3.3.2.4.1. Submission, review and acceptance of design packages, including BIM
- 3.3.2.4.2. Submission of mechanical/electrical/information systems layout drawings
- 3.3.2.4.3. Submission and approval of O & M manuals
- 3.3.2.4.4. Submission and approval of as-built drawings
- 3.3.2.4.5. Submission and approval of 1354 data and installed equipment lists
- 3.3.2.4.6. Submission and approval of testing and air balance (TAB)
- 3.3.2.4.7. Submission of TAB specialist design review report



3.3.2.4.8. Submission and approval of fire protection specialist

3.3.2.4.9. Submission and approval of testing and balancing of HVAC plus commissioning plans and data. Develop the schedule logic associated with testing and commissioning of mechanical systems to a level of detail consistent with the contract commissioning requirements.

3.3.2.4.10. Air and water balancing

3.3.2.4.11. HVAC commissioning

3.3.2.4.12. Controls testing plan submission

3.3.2.4.13. Controls testing

3.3.2.4.14. Performance Verification testing

3.3.2.4.15. Other systems testing, if required

3.3.2.4.16. Contractor's pre-final inspection

3.3.2.4.17. Correction of punch list from Contractor's pre-final inspection

3.3.2.4.18. Government's pre-final inspection

3.3.2.4.19. Correction of punch list from Government's pre-final inspection

3.3.2.4.20. Final Inspection

3.3.2.5. Government Activities. Show Government and other agency activities that could impact progress. These activities include but are not limited to: approvals, design reviews, review conferences, release for construction of design package(s), environmental permit approvals by State regulators, inspections, utility tie-ins, Government Furnished Property/Equipment (GFP) and Notice to Proceed for phasing requirements, if any.

3.3.2.6. Activity Responsibility Coding (RESP)

Assign Responsibility Code for all activities to the Prime Contractor, Subcontractor or Government agency responsible for performing the activity. Activities coded with a Government Responsibility code include, but are not limited to: Government approvals, Government design reviews, environmental permit approvals by State regulators, Government Furnished Equipment (GFE) and Notice to Proceed (NTP) for phasing requirements. Code all activities not coded with a Government Responsibility Code to the Prime Contractor or Subcontractor responsible to perform the work. Activities shall not have more than one Responsibility Code. Examples of acceptable activity code values are: DOR (for the designer of record); ELEC (for the electrical subcontractor); MECH (for the mechanical subcontractor); and GOVT (for USACE). Unacceptable code values are abbreviations of the names of subcontractors.

3.3.2.7. Activity Work Area Coding (AREA)

Assign Work Area code to activities based upon the work area in which the activity occurs. Define work areas based on resource constraints or space constraints that would preclude a resource, such as a particular trade or craft work crew from working in more than one work area at a time due to restraints on resources or space. Examples of Work Area Coding include different areas within a floor of a building, different floors within a building, and different buildings within a complex of buildings. Activities shall not have more than one Work Area Code. Not all activities are required to be Work Area coded. A lack of Work Area coding will indicate the activity is not resource or space constrained.

3.3.2.8. Contract Changes/Requests for Equitable Adjustment (REA) Coding (MODF)

Assign Activity code to any activity or sequence of activities added to the schedule as a result of a Contract Modification, when approved by Contracting Officer, with a Contract Changes/REA Code. Key all Code values to

the Government's modification numbering system. Any activity or sequence of activities added to the schedule as a result of alleged constructive changes made by the Government may be added to a copy of the current schedule, subject to the approval of the Contracting Officer. Assign Activity codes for these activities with a Contract Changes/REA Code. Key the code values to the Contractor's numbering system. Approval to add these activities does not necessarily mean the Government accepts responsibility and therefore liability for such activities and any associated impacts to the schedule, but rather the Government recognizes such activities are appropriately added to the schedule for the purposes of maintaining a realistic and meaningful schedule. Such activities shall not be Responsibility Coded to the Government unless approved. An activity shall not have more than one Contract Changes/REA Code

#### 3.3.2.9. Contract Line Item (CLIN) Coding (BIDI)

Code all activities to the CLIN on the Contract Line Item Schedule to which the activity belongs. An activity shall not contain more than one CLIN Item Code. CLIN Item code all activities, even when an activity is not cost loaded.

#### 3.3.2.10. Phase of Work Coding (PHAS)

Assign Phase of Work Code to all activities, based upon the phase of work in which the activity occurs. Code activities to either a Design Phase or a Construction Phase. Code fast track design and construction phases proposed by the Contractor to allow filtering and organizing the schedule by fast track design and construction packages. If the contract specifies construction phasing with separately defined performance periods, identify a Construction Phase Code to allow filtering and organizing the schedule accordingly. Each activity shall have only one Phase of Work code.

#### 3.3.2.11. Category of Work Coding (CATW)

Assign Category of Work code to all Activities based upon the category of work which the activity belongs. Category of Work Code must include, but is not limited to: Design, Design Submittal, design reviews, review conferences, Construction Submittal, Approvals (if any), Acceptance, Procurement, Fabrication, Delivery, Weather Sensitive Installation, Non-Weather Sensitive Installation, Start Up, Test, and Turnover. Assign a Category of Work code to each activity. Each activity shall have only one Category of Work Code.

#### 3.3.2.12. Definable Features of Work Coding (FOW1, FOW2, FOW3)

Assign a Definable Feature of Work Code to appropriate activities based on the definable feature of work to which the activity belongs. Definable Feature of Work is defined in Specification Section 01 45 04.00 10, Contractor Quality Control. An activity shall not have more than one Definable Feature of Work Code. Not all activities are required to be Definable Feature of Work Coded.

### 3.3.3. Scheduled Project Completion and Activity Calendars

The schedule interval shall extend from NTP date to the required contract completion date. The contract completion activity (End Project) shall finish based on the required contract duration, as adjusted for any approved contract time extensions. The first scheduled work period shall be the day after NTP is acknowledged by the Contractor. Schedule activities on a calendar to which the activity logically belongs. Activities may be assigned to a 7 day calendar when the contract assigns calendar day durations for the activity such as a Government Acceptance activity. If the Contractor intends to perform physical work less than seven days per week, schedule the associated activities on a calendar with non-work periods identified including weekends and holidays. Assign the Category of Work Code - Weather Sensitive Installation to those activities that are weather sensitive. Original durations must account for anticipated normal adverse weather. The Government will interpret all work periods not identified as non-work periods on each calendar as meaning the Contractor intends to perform work during those periods.

#### 3.3.3.1. Project Start Date

The schedule shall start no earlier than the date on which the NTP was acknowledged. Include as the first activity in the project schedule an activity called "Start Project" or "NTP". The "Start Project" activity shall have an "ES" constraint date equal to the date that the NTP was acknowledged, with a zero day duration.

#### 3.3.3.2. Schedule Constraints and Open Ended Logic

Constrain completion of the last activity in the schedule by the contract completion date. Schedule calculations shall result in negative float when the calculated early finish date of the last activity is later than the contract completion date. Include as the last activity in the project schedule an activity called "End Project". The "End Project" activity shall have an "LF" constraint date equal to the contract completion date for the project, and with a zero day duration or by using the "project must finish by" date in the scheduling software. The schedule shall have no constrained dates other than those specified in the contract. The use of artificial float constraints such as "zero free float" or "zero total float" are typically prohibited. There shall only be 2 open ended activities: Start Project (or NTP) with no predecessor logic and End Project with no successor logic.

#### 3.3.3.3. Early Project Completion

In the event the Preliminary or Initial project schedule calculates an early completion date of the last activity prior to the contract completion date, the Contractor shall identify those activities that it intends to accelerate and/or those activities that are scheduled in parallel to support the Contractor's "early" completion. The last activity shall have a late finish constraint equal to the contract completion date and the schedule will calculate positive float. The Government will not approve an early completion schedule with zero float on the longest path. The Government is under no obligation to accelerate activities for which it is responsible to support a proposed early contract completion.

#### 3.3.4. Interim Completion Dates

Constrain contractually specified interim completion dates to show negative float when the calculated early finish date of the last activity in that phase is later than the specified interim completion date.

##### 3.3.4.1. Start Phase

Include as the first activity for a project phase an activity called "Start Phase X" where "X" refers to the phase of work. The "Start Phase X" activity shall have an "ES" constraint date equal to the date on which the NTP was acknowledged, and a zero day duration.

##### 3.3.4.2. End Phase

Include as the last activity for a project phase an activity called "End Phase X" where "X" refers to the phase of work. The "End Phase X" activity shall have an "LF" constraint date equal to the specified completion date for that phase and a zero day duration.

##### 3.3.4.3. Phase "X" Hammock

Include a hammock type activity for each project phase called "Phase X" where "X" refers to the phase of work. The "Phase X" hammock activity shall be logically tied to the earliest and latest activities in the phase.

#### 3.3.5. Default Progress Data Disallowed

Do not automatically update Actual Start and Finish dates with default mechanisms that may be included in the scheduling software. Activity Actual Start (AS) and Actual Finish (AF) dates assigned during the updating process shall match those dates provided from Contractor Quality Control Reports. Failure of the Contractor to document the AS and AF dates on the Daily Quality Control report for every in-progress or completed activity, and failure to ensure that the data contained on the Daily Quality Control reports is the sole basis for schedule updating shall result in the disapproval of the Contractor's updated schedule and the inability of the Contracting Officer to evaluate Contractor progress for payment purposes. Updating of the percent complete and the remaining duration of any activity shall be independent functions. Disable program features which calculate one of these parameters from the other.

#### 3.3.6. Out-of-Sequence Progress

Activities that have progressed before all preceding logic has been satisfied (Out-of-Sequence Progress) will be allowed only on a case-by-case basis subject to approval by the Contracting Officer. Propose logic corrections to eliminate all out of sequence progress or justify not changing the sequencing for approval prior to submitting an

updated project schedule. Correct out of sequence progress that continues for more than two update cycles by logic revision, as approved by the Contracting Officer.

#### 3.3.7. Negative Lags and Start to Finish Relationships

Lag durations contained in the project schedule shall not have a negative value. Do not use Start to Finish relationships (SF).

#### 3.3.8. Calculation Mode

Schedule calculations shall retain the logic between predecessors and successors even when the successor activity starts and the predecessor activity has not finished. Software features that in effect sever the tie between predecessor and successor activities when the successor has started and the predecessor logic is not satisfied ("progress override") will not be allowed.

#### 3.3.9. Milestones

Include milestone activities for each significant project event including but not limited to: milestone activities for each fast track design package released for construction; design complete; foundation/substructure construction complete; superstructure construction complete; building dry-in or enclosure complete to allow the initiation of finish activities; permanent power complete; and building systems commissioning complete.

### 3.4. PROJECT SCHEDULE SUBMISSIONS

Provide the submissions as described below. The data CD, reports, and network diagrams required for each submission are contained in paragraph SUBMISSION REQUIREMENTS.

#### 3.4.1. Preliminary Project Schedule Submission

Submit the Preliminary Project Schedule, defining the Contractor's planned operations for the first 90 calendar days for approval within 15 calendar days after the NTP is acknowledged. The approved Preliminary Project Schedule will be used for payment purposes not to exceed 90 calendar days after NTP. Completely cost load the Preliminary Project Schedule to balance the contract award CLINS shown on the Price Schedule. Detail it for the first 90 calendar days. It may be summary in nature for the remaining performance period. It must be early start and late finish constrained and logically tied as previously specified. The Preliminary Project Schedule forms the basis for the Initial Project Schedule specified herein and must include all of the required Plan and Program preparations, submissions and approvals identified in the contract (for example, Quality Control Plan, Safety Plan, and Environmental Protection Plan) as well as design activities, the planned submissions of all early design packages, permitting activities, design review conference activities and other non-construction activities intended to occur within the first 90 calendar days. Schedule any construction activities planned for the first 90 calendar days after NTP. Constrain planned construction activities by Government acceptance of the associated design package(s) and all other specified Program and Plan approvals. Activity code any activities that are summary in nature after the first 90 calendar days with Responsibility Code (RESP) and Feature of Work code (FOW1, FOW2, FOW3)

#### 3.4.2. Initial Project Schedule Submission

Submit the Initial Project Schedule for approval within 42 calendar days after NTP. The schedule shall demonstrate a reasonable and realistic sequence of activities which represent all work through the entire contract performance period. The Initial Schedule shall be at a reasonable level of detail as determined by the Contracting Officer. Include detailed design and permitting activities, including but not limited to identification of individual design packages, design submission, reviews and conferences; permit submissions and any required Government actions; and long lead procurement activities required prior to design completion. The Initial Project Schedule shall include the entire construction sequence and all fast track construction activities, with as much detail as is known at the time but, as a minimum, shall include all construction start and completion milestone activities, and detailed construction activities through the dry-in milestone, including all activity coding and cost loading. Include the remaining construction, including cost loading, but it may be scheduled summary in nature. As the design proceeds and design packages are developed, fully detail the remaining construction activities concurrent with the monthly schedule updating process. Constrain construction activities by Government acceptance of associated

designs. When the design is complete, incorporate into the then approved schedule update all remaining detailed construction activities that are planned to occur after the dry-in milestone.

#### 3.4.3. Design Package Schedule Submission:

With each design package submitted to the Government, submit a frag-net schedule extracted from the then current Preliminary, Initial or Updated schedule which covers the activities associated with that Design Package including construction, procurement and permitting activities.

#### 3.4.4. Periodic Schedule Updates

Based on the result of the meeting specified in PERIODIC SCHEDULE UPDATE MEETINGS, submit periodic schedule updates. These submissions shall enable the Contracting Officer to assess Contractor's progress. If the Contractor fails or refuses to furnish the information and project schedule data, which in the judgment of the Contracting Officer or authorized representative is necessary for verifying the Contractor's progress, the Contractor shall be deemed not to have provided an estimate upon which progress payment may be made. Update the schedule to include detailed lower WBS activities procurement and construction activities as the design progresses, but not later than the submission of the final, un-reviewed design submission for each separate design package. The Contracting Officer may require submission of detailed schedule activities for any distinct construction that is started prior to submission of a final design submission, if such activity is authorized.

#### 3.4.5. Standard Activity Coding Dictionary

Use the activity coding structure defined in the Standard Data Exchange Format (SDEF) in ER 1-1-11, Appendix A. This exact structure is mandatory, even if some fields are not used. A template SDEF compatible schedule backup file (sdef.prx) is available on the QCS website: [www.rmssupport.com](http://www.rmssupport.com). The SDEF format is as follows:

Field	Activity Code	Length	Description
1	WRKP	3	Workers per Day
2	RESP	4	Responsible Party (e.g. GC, subcontractor, USACE)
3	AREA	4	Area of Work
4	MODF	6	Modification or REA number
5	BIDI	6	Bid Item (CLIN)
6	PHAS	2	Phase of Work
7	CATW	1	Category of Work
8	FOW1	10	Feature of Work (used up to 10 characters in length)
9	FOW2	10	Feature of Work (used up to 20 characters in length)
10	FOW3	10	Feature of Work (used up to 30 characters in length)

### 3.5. SUBMISSION REQUIREMENTS

Submit the following items for the Preliminary Schedule, Initial Schedule, and every Periodic Schedule Update throughout the life of the project:

#### 3.5.1. Data CD's

Provide two sets of data CD's containing the project schedule in the backup format. Each CD shall also contain all previous update backup files. File medium shall be CD. Label each CD, indicating the type of schedule (Preliminary, Initial, Update), full contract number, Data Date and file names. Each schedule shall have a unique file name as determined by the Contractor.

#### 3.5.2. Narrative Report

Provide a Narrative Report with the Preliminary, Initial, and each Periodic Update of the project schedule, as the basis of the progress payment request. The Narrative Report shall include: a description of activities along the 2 most critical paths where the total float is less than or equal to 20 work days, a description of current and anticipated problem areas or delaying factors and their impact, and an explanation of corrective actions taken or required to be taken. The narrative report is expected to communicate to the Government, the Contractor's thorough analysis of the schedule output and its plans to compensate for any problems, either current or potential, which are revealed through its analysis. Identify and explain why any activities that, based their calculated late dates, should have either started or finished during the update period but did not.

#### 3.5.3. Approved Changes Verification

Include only those project schedule changes in the schedule submission that have been previously approved by the Contracting Officer. The Narrative Report shall specifically reference, on an activity by activity basis, all changes made since the previous period and relate each change to documented, approved schedule changes.

#### 3.5.4. Schedule Reports

The format, filtering, organizing and sorting for each schedule report shall be as directed by the Contracting Officer. Typically reports shall contain: Activity Numbers, Activity Description, Original Duration, Remaining Duration, Early Start Date, Early Finish Date, Late Start Date, Late Finish Date Total Float, Actual Start Date, Actual Finish Date, and Percent Complete. The following lists typical reports that will be requested. One or all of these reports may be requested for each schedule submission.

##### 3.5.4.1. Activity Report

A list of all activities sorted according to activity number.

##### 3.5.4.2. Logic Report

A list of detailed predecessor and successor activities for every activity in ascending order sorted by activity number.

##### 3.5.4.3. Total Float Report

A list of all incomplete activities sorted in ascending order of total float. List activities which have the same amount of total float in ascending order of Early Start Dates. Do not show completed activities on this report.

##### 3.5.4.4. Earnings Report by CLIN

A compilation of the Contractor's Total Earnings on the project from the NTP to the data date. This report shall reflect the earnings of specific activities based on the agreements made in the schedule update meeting defined herein. Provided that the Contractor has provided a complete schedule update, this report shall serve as the basis of determining progress payments. Group activities by CLIN Item number and sort by activity number. This report shall: sum all activities coded to a particular CLIN and provide a CLIN Item percent earned value; and complete and sum CLIN items to provide a total project percent complete. The printed report shall contain, for each activity: the Activity Number, Activity Description, Original Budgeted Amount, Quantity to Date, Percent Complete (based on cost), and Earnings to Date.

### 3.5.5. Network Diagram

The network diagram is required for the Preliminary, Initial and Periodic Updates. Depict and display the order and interdependence of activities and the sequence in which the work is to be accomplished. The Contracting Officer will use, but is not limited to, the following conditions to review compliance with this paragraph:

#### 3.5.5.1. Continuous Flow

Show a continuous flow from left to right with no arrows from right to left. Show the activity number, description, duration, and estimated earned value on the diagram.

#### 3.5.5.2. Project Milestone Dates

Show dates on the diagram for start of project, any contract required interim completion dates, and contract completion dates.

#### 3.5.5.3. Critical Path

Clearly show the critical path.

#### 3.5.5.4. Banding

Organize activities as directed to assist in the understanding of the activity sequence. Typically, this flow will group activities by category of work, work area and/or responsibility.

#### 3.5.5.5. S-Curves

Earnings curves showing projected early and late earnings and earnings to date.

### 3.6. PERIODIC SCHEDULE UPDATE MEETINGS

Conduct periodic schedule update meetings for the purposes of reviewing the Contractor's proposed out of sequence corrections, determining causes for delay, correcting logic, maintaining schedule accuracy and determining earned value. Meetings shall occur at least monthly within five days of the proposed schedule data date and after the Contractor has updated the schedule with Government concurrence respecting actual start dates, actual finish dates, remaining durations and percent complete for each activity it intend to status. Match the actual start and finish dates with the dates exported, as described in paragraph 3.3.5. Provide a computer with the scheduling software loaded and a projector during the meeting which allows all meeting participants to view the proposed schedule update during the meeting. The meeting and resultant approvable schedule update shall be a condition precedent to a formal submission of the update as described in SUBMISSION REQUIREMENTS and to the submission of an invoice for payment. The meeting will be a working interactive exchange which will allow the Government and the Contractor the opportunity review the updated schedule on a real time and interactive basis. The Contractor's authorized scheduling representative will organize, sort, filter and schedule the update as requested by the Government. The meeting will last no longer than 8 hours. A rough draft of the proposed activity logic corrections and narrative report shall be provided to the Government 48 hours in advance of the meeting. The Contractor's Project Manager and Authorized Scheduler shall attend the meeting with the Authorized Representative of the Contracting Officer.

#### 3.6.1. Update Submission Following Progress Meeting

Submit a complete update of the project schedule containing all approved progress, revisions, and adjustments, pursuant to paragraph SUBMISSION REQUIREMENTS not later than 4 working days after the periodic schedule update meeting, reflecting only those changes made during the previous update meeting.

#### 3.6.2. Status of Activities

Update status information, including Actual Start Dates (AS), Actual Finish Dates (AF), Remaining Durations (RD) and Percent Complete shall be subject to the approval of the Government prior to the meeting. As a minimum, address the following items on an activity by activity basis during each progress meeting:

### 3.6.2.1. Actual Start and Finish Dates

Accurately status the AS and/or AF dates for each activity currently in-progress or completed since the last update. The Government may allow an AF date to be assigned with the percent complete less than 100% to account for the value of work remaining but not restraining successor activities. Only assign AS dates when actual progress occurs on an activity.

### 3.6.2.2. Remaining Duration

Update the estimated RD for all incomplete activities independent of Percent Complete. Remaining durations may exceed the activity OD or may exceed the activity's prior update RD if the Government considers the current OD or RD to be understated based on current progress, insufficient work crews actually manning the job, unrealistic OD or deficiencies that must be corrected that restrain successor activities.

### 3.6.2.3. Percent Complete

Update the percent complete for each activity started, based on the realistic assessment of earned value. Activities which are complete but for remaining minor punch list work and which do not restrain the initiation of successor activities may be statused 100 percent complete. To allow for proper schedule management, cost load the correction of punch list from Government pre-final inspection activity(ies) not less than 1% of the total contract value, which activity(ies) may be declared 100 percent complete upon completion and correction of all punch list work identified during Government pre-final inspection(s).

### 3.6.2.4. Logic Changes

Specifically identify and discuss all logic changes pertaining to NTP on change orders, change orders to be incorporated into the schedule, contractor proposed changes in work sequence, corrections to schedule logic for out-of-sequence progress, and other changes that have been made pursuant to contract provisions. The Government will only approve logic revisions for the purpose of keeping the schedule valid in terms of its usefulness in calculating a realistic completion date, correcting erroneous logic ties, and accurately sequencing the work.

### 3.6.2.5. Other Changes

Other changes required due to delays in completion of any activity or group of activities include: 1) delays beyond the Contractor's control, such as strikes and unusual weather. 2) delays encountered due to submittals, Government Activities, deliveries or work stoppages which make re-planning the work necessary. 3) Changes required to correct a schedule that does not represent the actual or planned prosecution and progress of the work.

## 3.7. REQUESTS FOR TIME EXTENSIONS

In the event the Contractor believes it is entitled to an extension of the contract performance period, completion date, or any interim milestone date, furnish the following for a determination by the Contracting Officer: justification, project schedule data, and supporting evidence as the Contracting Officer may deem necessary. Submission of proof of excusable delay, based on revised activity logic, duration, and costs (updated to the specific date that the delay occurred) is a condition precedent to any approvals by the Government. In response to each Request For Proposal issued by the Government, the Contractor shall submit a schedule impact analysis demonstrating whether or not the change contemplated by the Government impacts the critical path.

### 3.7.1. Justification of Delay

The project schedule shall clearly display that the Contractor has used, in full, all the float time available for the work involved with its request. The Contracting Officer's determination as to the number of allowable days of contract extension shall be based upon the project schedule updates in effect for the time period in question, and other factual information.

Actual delays that are found to be caused by the Contractor's own actions, which result in a calculated schedule delay, will not be a cause for an extension to the performance period, completion date, or any interim milestone date.



### 3.7.2. Submission Requirements

Submit a justification for each request for a change in the contract completion date of less than 2 weeks based upon the most recent schedule update at the time of the NTP or constructive direction issued for the change. Such a request shall be in accordance with the requirements of other appropriate Contract Clauses and shall include, as a minimum:

3.7.2.1. A list of affected activities, with their associated project schedule activity number.

3.7.2.2. A brief explanation of the causes of the change

3.7.2.3. An analysis of the overall impact of the changes proposed.

3.7.2.4. A sub-network of the affected area

Identify activities impacted in each justification for change by a unique activity code contained in the required data file.

### 3.7.3. Additional Submission Requirements

The Contracting Officer may request an interim update with revised activities for any requested time extension of over 2 weeks. Provide this disk within 4 days of the Contracting Officer's request.

### 3.7.4. If Progress Falls Behind the Approved Project Schedule

3.7.4.1. Should progress fall behind the approved schedule (more than 20 work days of negative float) due to Contractor generated problems, promptly provide a supplemental recovery or completion schedule that illustrates its efforts to regain time to assure a completion by the required contract completion date.

3.7.4.2. The supplemental recovery or completion schedule will not replace the original, approved schedule as the official contract schedule. Continue to update the original, approved schedule on at least a monthly basis. In addition, the Contractor and the Contracting Officer will monitor the supplemental recovery or completion schedule on at least a bi-weekly basis to determine its effect on regaining the rate of progress to assure project completion by the contractually required completion date.

3.7.4.3. Do not artificially improve progress by simply revising the schedule logic, modifying or adding constraints, or shortening future work activity durations. Resource and manpower load the supplemental recovery schedule or completion schedule with crew size and productivity for each remaining activity, indicating overtime, weekend work, and/or double shifts needed to regain the schedule, in accordance with FAR 52.236.15, without additional cost to the Government. Indicate assumptions made and the basis for any logic, constraint, or duration changes used in the creation of the supplemental recovery or completion schedule in a narrative submitted for the Contracting Officer's approval. Any additional resources or manpower must be evident at the work site. Do not modify the official contract schedule to include these assumptions.

3.7.4.4. Failure to perform work and maintain progress in accordance with the supplemental recovery or completion schedule may result in an interim and final unsatisfactory performance rating and/or may result in corrective action by the Contracting Officer in accordance with FAR 52.236-15.

### 3.8. DIRECTED CHANGES

If the NTP is issued for changes prior to settlement of price and/or time, submit proposed schedule revisions to the Contracting Officer within 2 weeks of the NTP being issued. The Contracting Officer will approve proposed revisions to the schedule prior to inclusion of those changes within the project schedule. If the Contractor fails to submit the proposed revisions, the Contracting Officer may furnish the Contractor with suggested revisions to the project schedule. The Contractor shall include these revisions in the project schedule until revisions are submitted and final changes and impacts have been negotiated. If the Contractor has any objections to the revisions furnished by the Contracting Officer, advise the Contracting Officer within 2 weeks of receipt of the revisions. Regardless of the objections, the Contractor shall continue to update the schedule with the Contracting Officer's revisions until a mutual agreement in the revisions is reached. If the Contractor fails to submit alternative revisions within 2 weeks of

receipt of the Contracting Officer's proposed revisions, the Contractor will be deemed to have concurred with the Contracting Officer's proposed revisions. The proposed revisions will then be the basis for an equitable adjustment for performance of the work.

### 3.9. WEEKLY PROGRESS MEETINGS

3.9.1. The Government and the Contractor shall meet weekly (or as otherwise mutually agreed to) between the meetings described in paragraph PERIODIC SCHEDULE UPDATE MEETINGS for the purpose of jointly reviewing the actual progress of the project as compared to the as planned progress and to review planned activities for the upcoming two weeks. The then current and approved schedule update shall be used for the purposes of this meeting and for the production and review of reports. The Contractor's Project Manager and the Authorized Representative of the Contracting Officer shall attend. The weekly progress meeting will address the status of RFI's, RFP's and Submittals.

3.9.2. Provide a bar chart produced by the scheduling software, organized by Total Float and Sorted by Early Start Date, and a two week "look-ahead" schedule by filtering all schedule activities to show only current ongoing activities and activities schedule to start during the upcoming two weeks, organized by Work Area Code (AREA) and sorted by Early Start Date.

3.9.3. The Government and the Contractor shall jointly review the reports. If it appears that activities on the longest path(s) which are currently driving the calculated completion date (driving activities), are not progressing satisfactorily and therefore could jeopardize timely project completion, corrective action must be taken immediately. Corrective action includes but is not limited to: increasing the number of work crews; increasing the number of work shifts; increasing the number of hours worked per shift; and determining if Government responsibility coded activities require Government corrective action.

### 3.10. OWNERSHIP OF FLOAT

Float available in the schedule, at any time, shall not be considered for the exclusive use of either the Government or the Contractor.

### 3.11. TRANSFER OF SCHEDULE DATA INTO RMS/QCS

Download and upload the schedule data into the Resident Management System (RMS) prior to RMS databases being transferred to the Government and is considered to be additional supporting data in a form and detail required by the Contracting Officer pursuant to FAR 52.232-5 - Payments under Fixed-Price Construction Contracts. The receipt of a proper payment request pursuant to FAR 52.232-27 - Prompt Payment for Construction Contracts is contingent upon the Government receiving both acceptable and approvable hard copies and electronic export from QCS of the application for progress payment.

End of Section 01 32 01.00 10

**SECTION 01 33 00  
SUBMITTAL PROCEDURES**

**1.0 GENERAL**

- 1.1. DEFINITIONS
- 1.2. NOT USED
- 1.3. SUBMITTAL CLASSIFICATION
- 1.4. APPROVED OR CONCURRED WITH SUBMITTALS
- 1.5. DISAPPROVED SUBMITTALS
- 1.6. WITHHOLDING OF PAYMENT
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- 1.8. SUBMITTAL REGISTER
- 1.9. SCHEDULING
- 1.10. TRANSMITTAL FORM (ENG FORM 4025)
- 1.11. SUBMITTAL PROCEDURES
- 1.12. CONTROL OF SUBMITTALS
- 1.13. GOVERNMENT APPROVED SUBMITTALS
- 1.14. INFORMATION ONLY SUBMITTALS
- 1.15. STAMPS

## 1.0 GENERAL

### 1.1. DEFINITIONS

#### 1.1.1. Submittal

Contract Clauses "FAR 52.236-5, Material and Workmanship," paragraph (b) and "FAR 52.236-21, Specifications and Drawings for Construction," paragraphs (d), (e), and (f) apply to all "submittals."

#### 1.1.2. Submittal Descriptions (SD)

Submittals requirements are specified in the technical sections. Submittals are identified by SD numbers and titles as follows.

##### SD-01 Preconstruction Submittals

- Certificates of insurance.
- Surety bonds.
- List of proposed subcontractors.
- List of proposed products.
- Construction Progress Schedule.
- Submittal register.
- Schedule of prices.
- Accident Prevention Plan.
- Work plan.
- Quality control plan.
- Environmental protection plan.

##### SD-02 Shop Drawings

- Drawings, diagrams and schedules specifically prepared to illustrate some portion of the work.
- Diagrams and instructions from a manufacturer or fabricator for use in producing the product and as aids to the Contractor for integrating the product or system into the project.
- Drawings prepared by or for the Contractor to show how multiple systems and interdisciplinary work will be coordinated.

##### SD-03 Product Data

- Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions and brochures illustrating size, physical appearance and other characteristics of materials or equipment for some portion of the work.
- Samples of warranty language when the contract requires extended product warranties.

##### SD-04 Samples

- Physical examples of materials, equipment or workmanship that illustrate functional and aesthetic characteristics of a material or product and establish standards by which the work can be judged.
- Color samples from the manufacturer's standard line (or custom color samples if specified) to be used in selecting or approving colors for the project.
- Field samples and mock-ups constructed on the project site establish standards by which the ensuring work can be judged. Includes assemblies or portions of assemblies that are to be incorporated into the project and those which will be removed at conclusion of the work.

##### SD-05 Design Data

- Calculations, mix designs, analyses or other data pertaining to a part of work.
- Design submittals, design substantiation submittals and extensions of design submittals.

##### SD-06 Test Reports

- Report signed by authorized official of testing laboratory that a material, product or system identical to the material, product or system to be provided has been tested in accord with specified requirements. (Testing must

have been within three years of date of contract award for the project.)

- Report which includes findings of a test required to be performed by the Contractor on an actual portion of the work or prototype prepared for the project before shipment to job site.
- Report which includes finding of a test made at the job site or on sample taken from the job site, on portion of work during or after installation.
- Investigation reports.
- Daily checklists.
- Final acceptance test and operational test procedure.

#### SD-07 Certificates

- Statements printed on the manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements. Must be dated after award of project contract and clearly name the project.
- Document required of Contractor, or of a supplier, installer or subcontractor through Contractor, the purpose of which is to further quality of orderly progression of a portion of the work by documenting procedures, acceptability of methods or personnel qualifications.
- Confined space entry permits.
- Text of posted operating instructions.

#### SD-08 Manufacturer's Instructions

- Preprinted material describing installation of a product, system or material, including special notices and Material Safety Data sheets concerning impedances, hazards and safety precautions.

#### SD-09 Manufacturer's Field Reports

- Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- Factory test reports.

#### SD-10 Operation and Maintenance Data

- Data that is furnished by the manufacturer, or the system provider, to the equipment operating and maintenance personnel. This data is needed by operating and maintenance personnel for the safe and efficient operation, maintenance and repair of the item.

#### SD-11 Closeout Submittals

- Documentation to record compliance with technical or administrative requirements or to establish an administrative mechanism.

##### 1.1.3. Approving Authority

Office authorized to approve submittal.

##### 1.1.4. Work

As used in this section, on- and off-site construction required by contract documents, including labor necessary to produce submittals, construction, materials, products, equipment, and systems incorporated or to be incorporated in such construction.

##### 1.2. NOT USED

##### 1.3. SUBMITTAL CLASSIFICATION

Submittals are classified as follows:

##### 1.3.1. Designer of Record Approved (DA)

1.3.1.1. Designer of Record (DOR) approval is required for all extensions of design, critical materials, equipment whose compatibility with the entire system must be checked, and other items as designated by the Contracting Officer. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction", they are considered to be "shop drawings". Provide the Government the number of copies designated hereinafter of all DOR approved submittals, after the DOR has taken appropriate action. The DOR shall ensure that submittals conform to the Solicitation, the Accepted Proposal and the completed design, however see below for those submittals proposing a deviation to the contract or a substitution of a material, system, or piece of equipment that was identified by manufacturer, brand name or model description in the accepted contract proposal.

1.3.1.2. The DOR shall ensure that the submittals comply with all applicable Buy American Act and Trade Agreement Act clauses in the contract. The DOR may confer with the Contracting Officer's Representative for advice and interpretation of those clauses, as necessary.

1.3.1.3. The Government may, but is not required to, review any or all DOR approved submittals for conformance to the solicitation, accepted proposal and the completed design. Except for submittals designated as deviating from the Solicitation, the Accepted Proposal or completed design, the Contractor may proceed with acquisition and installation upon DOR approval. Government Approved (GA)

#### 1.3.2. Government Approved (GA)

Government approval is required for any item specifically designated as requiring Government approval in the Solicitation, for internal and external color finish selections and other items as designated by the Contracting Officer. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction," they are considered to be "shop drawings."

#### 1.3.3. Government Conformance Review of Design (CR)

The Government will review all intermediate and final design submittals for conformance with the technical requirements of the solicitation. Section 01 33 16 **DESIGN AFTER AWARD** covers the design submittal and review process in detail. Review will be only for conformance with the applicable codes, standards and contract requirements. Design data includes the design documents described in Section 01 33 16 **DESIGN AFTER AWARD**. Generally, design submittals should be identified as SD-05 Design Data submittals.

#### 1.3.4. Designer of Record Approved/Government Conformance Review (DA/CR)

1.3.4.1. Deviations to the Accepted Design. Designer of Record approval and the Government's concurrence are required for any proposed deviation from the accepted design which still complies with the contract (the Solicitation and Accepted Proposal) before the Contractor is authorized to proceed with material acquisition or installation. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction", they are considered to be "shop drawings." If necessary to facilitate the project schedule, the Contractor and the DOR may discuss a submittal proposing a deviation with the Contracting Officer's Representative prior to officially submitting it to the Government. However, the Government reserves the right to review the submittal before providing an opinion, if it deems it necessary. In any case, the Government will not formally agree to or provide a preliminary opinion on any deviation without the DOR's approval or recommended approval. The Government reserves the right to non-concur with any deviation from the design, which may impact furniture, furnishings, equipment selections or operations decisions that were made, based on the reviewed and concurred design.

1.3.4.2. Substitutions. Unless prohibited or provided for otherwise elsewhere in the Contract, where the accepted contract proposal named products, systems, materials or equipment by manufacturer, brand name and/or by model number or other specific identification, and the Contractor desires to substitute manufacturer or model after award, submit a requested substitution for Government concurrence. Include substantiation, identifying information and the DOR's approval, as meeting the contract requirements and that it is equal in function, performance, quality and salient features to that in the accepted contract proposal.

#### 1.3.5. Designer of Record Approved/Government Approved (DA/GA)

Any proposed deviation to the solicitation and/or the accepted proposal constitutes a change to the contract. In addition to the above stated requirements for proposed deviations to the accepted design, both Designer of Record and Government Approval and, where applicable, a contract modification are required before the Contractor is

authorized to proceed with material acquisition or installation for any proposed deviation to the contract. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction", they are considered to be "shop drawings". The Government reserves the right to accept or reject any such proposed deviation at its discretion.

#### 1.3.6. Information Only

All submittals not requiring Designer of Record or Government approval will be for information only. Provide the Government "For Information Only" copies of all submittals not requiring Government approval or concurrence, after the Designer of Record has taken the appropriate action.

#### 1.4. APPROVED OR CONCURRED WITH SUBMITTALS

Do not construe the Contracting Officer's approval of or concurrence with submittals as a complete check, but only that design, general method of construction, materials, detailing and other information appear to meet the Solicitation and Accepted Proposal. Approval or concurrence will not relieve the Contractor of the responsibility for any error which may exist, as the Contractor under the Contractor Quality Control (CQC) requirements of this contract is responsible for design, dimensions, all design extensions, such as the design of adequate connections and details, etc., and the satisfactory construction of all work. The Government won't consider re-submittals for the purpose of substituting previously approved materials or equipment unless accompanied by an explanation of why a substitution is necessary.

#### 1.5. DISAPPROVED SUBMITTALS

Make all corrections required by the Contracting Officer, obtain the Designer of Record's approval when applicable, and promptly furnish a corrected submittal in the form and number of copies specified for the initial submittal. Resubmit any "information only" submittal found to contain errors or unapproved deviations from the Solicitation or Accepted Proposal as one requiring "approval" action, requiring both Designer of Record and Government approval. If the Contractor considers any correction indicated on the submittals to constitute a change to the contract, provide prompt notice in accordance with the Contract Clause "Changes" to the Contracting Officer.

#### 1.6. WITHHOLDING OF PAYMENT

No payment for materials incorporated in the work will be made if all required Designer of Record or required Government approvals have not been obtained. No payment will be made for any materials incorporated into the work for any conformance review submittals or information only submittals found to contain errors or deviations from the Solicitation or Accepted Proposal.

#### 1.7. GENERAL

Make submittals as required by the specifications. The Contracting Officer may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in the respective sections. Units of weights and measures used on all submittals shall be the same as those used in the contract drawings. Each submittal shall be complete and in sufficient detail to allow ready determination of compliance with contract requirements. Prior to submittal, the Contractor's Quality Control (CQC) System Manager and the Designer of Record, if applicable, shall check, approve, sign, and stamp all items, indicating action taken. Clearly identify proposed deviations from the contract requirements. Include items such as: Contractor's, manufacturer's, or fabricator's drawings; descriptive literature including (but not limited to) catalog cuts, diagrams, operating charts or curves; test reports; test cylinders; samples; O&M manuals (including parts list); certifications; warranties; and other such required submittals. Schedule and make submittals requiring Government approval prior to the acquisition of the material or equipment covered thereby. Pick up and dispose of samples remaining upon completion of the work in accordance with manufacturer's Material Safety Data Sheets (MSDS) and in compliance with existing laws and regulations.

#### 1.8. SUBMITTAL REGISTER (GA)

Develop a complete list of submittals, including each separate design package submittal. Submit the initial submittal register within 15 days after Notice to Proceed, including, as a minimum, the design packages and other initial submittals required elsewhere in the contract. The Designer of Record shall identify required submittals in the

specifications, and use the list to prepare the Submittal Register, utilizing the government-provided software, QCS (see Section 01 45 01.10), to create the ENG Form 4288. Appendix R is a preliminary submittal register input form for use with the Quality Management System and the Resident Office Management System (QCS and RMS). The Government will provide the Contractor the actual Excel Spreadsheet version of this sample input form after award to modify and to use for input into QCS. The Excel Spreadsheet is not totally inputable into QCS, so additional keystroke input will be necessary. The sample input form is not all-inclusive. In addition, additional submittals may be required by other parts of the contract. After award, the parties will meet to discuss contract specific (or task order specific for a task order contract) distribution for the submittals all-inclusive and additional submittals may be required by other parts of the contract. Develop and complete the submittal register as the design is completed. Submit it to the Contracting Officer with the un-reviewed final design package submission or as soon as the design specifications are completed, if before the final design submission. When applicable, if the Contractor elects to fast track design and construction, using multiple design package submissions, update the submittal register to reflect the submittals associated with each design submission, clearly denoting all revisions to the previous submission. The submittal register serves as a scheduling document for submittals and for control of submittal actions throughout the contract period. Coordinate the submit dates and need dates used in the submittal register with dates in the Contractor prepared progress schedule. Submit monthly updates to the submittal register showing the Contractor action codes and actual dates with Government action codes and actual dates or until all submittals have been satisfactorily completed. Revise and submit the submittal register when revising the progress schedule.

#### 1.9. SCHEDULING

Schedule submittals covering component items forming a system or items that are interrelated to be coordinated and submitted concurrently. Schedule certifications to be submitted with the pertinent drawings. Allow adequate time (a minimum of 15 calendar days exclusive of mailing time) and show on the register for those items requiring Government approval or concurrence. No delay damages or time extensions will be allowed for time lost in late submittals by the Contractor.

#### 1.10. TRANSMITTAL FORM (ENG FORM 4025)

Use the transmittal form (ENG Form 4025) for submitting submittals in accordance with the instructions on the reverse side of the form. These forms will be furnished to the Contractor or are included in the QCS software if the Contractor is required to use QCS for this contract. Use a separate transmittal form for each specification section. Complete this form by filling out all the heading blank spaces and identify each item submitted. Exercise special care to ensure proper listing of the specification paragraph and/or sheet number of the contract drawings pertinent to the data submitted for each item.

#### 1.11. SUBMITTAL PROCEDURES

Make submittals as follows:

##### 1.11.1. Procedures

The Government will further discuss detailed submittal procedures with the Contractor at the Post-Award Conference.

##### 1.11.2. Deviations

For submittals which include proposed deviations requested by the Contractor, check the column "variation" of ENG Form 4025. Set forth in writing the reason for any deviations and annotate such deviations on the submittal. The Government reserves the right to rescind inadvertent approval of submittals containing unnoted deviations.

#### 1.12. CONTROL OF SUBMITTALS

Carefully control his procurement operations to ensure that each individual submittal is made on or before the scheduled submittal date shown on the approved "Submittal Register."

#### 1.13. GOVERNMENT APPROVED OR CONCURRED WITH SUBMITTALS



Upon completion of review of submittals requiring Government approval or concurrence, the Government will stamp and date the submittals as approved or concurred.. The Government will retain one (1) copies of the submittal and return one (1) copy(ies) of the submittal.

#### 1.14. INFORMATION ONLY SUBMITTALS

Normally submittals for information only will not be returned. Approval of the Contracting Officer is not required on information only submittals. The Government reserves the right to require the Contractor to resubmit any item found not to comply with the contract. This does not relieve the Contractor from the obligation to furnish material conforming to the plans and specifications; will not prevent the Contracting Officer from requiring removal and replacement of nonconforming material incorporated in the work; and does not relieve the Contractor of the requirement to furnish samples for testing by the Government laboratory or for check testing by the Government in those instances where the technical specifications so prescribe. The Government will retain zero(0) copies of information only submittals.

#### 1.15. STAMPS

Use stamps similar to the following on the submittal data to certify that the submittal meets contract requirements:

CONTRACTOR

(FIRM NAME)

Approved

Approved with corrections as noted on submittal data and/or attached sheet(s)

Signature:

Title:

Date:

**For design-build construction, both the Contractor Quality Control System Manager and the Designer of Record shall stamp and sign to certify that the submittal meets contract requirements.**

**SECTION 01 33 16  
DESIGN AFTER AWARD**

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**ATTACHMENT F BUILDING INFORMATION MODELING REQUIREMENTS**

**ATTACHMENT G DESIGN SUBMITTAL DIRECTORY AND SUBDIRECTORY FILE ARRANGEMENT**

## **1.0 GENERAL INFORMATION**

### **1.1. INTRODUCTION**

1.1.1. The information contained in this section applies to the design required after award. After award, the Contractor will develop the accepted proposal into the completed design, as described herein.

1.1.2. The Contractor may elect to fast track the design and construction that is, proceed with construction of parts of the sitework and facilities prior to completion of the overall design. To facilitate fast tracking, the Contractor may elect to divide the design into no more than six (6) design packages per major facility type and no more than three (3) design packages for site and associated work. Designate how it will package the design, consistent with its overall plan for permitting (where applicable) and construction of the project. See Sections 01 33 00 SUBMITTAL PROCEDURES and 01 32 01.00 10 PROJECT SCHEDULE for requirements for identifying and scheduling the design packaging plan in the submittal register and project schedule. See also Sections 01 10 00 STATEMENT OF WORK and 01 57 20.00 10 ENVIRONMENTAL PROTECTION for any specified permit requirements. If early procurement of long-lead item construction materials or installed equipment, prior to completion of the associated design package, is necessary to facilitate the project schedule, also identify those long-lead items and how it will assure design integrity of the associated design package to meet the contract requirements (The Contract consists of the Solicitation requirements and the accepted proposal). Once the Government is satisfied that the long-lead items meet the contract requirements, the Contracting Officer will allow the Contractor to procure the items at its own risk.

1.1.3. The Contractor may proceed with the construction work included in a separate design package after the Government has reviewed the final (100%) design submission for that package, review comments have been addressed and resolved to the Government's satisfaction and the Contracting Officer (or the Administrative Contracting Officer) has agreed that the design package may be released for construction.

1.1.4. **INTEGRATED DESIGN.** To the maximum extent permitted for this project, use a collaborative, integrated design process for all stages of project delivery with comprehensive performance goals for siting, energy, water, materials and indoor environmental quality and ensures incorporation of these goals. Consider all stages of the building lifecycle, including deconstruction.

### **1.2. DESIGNER OF RECORD**

Identify, for approval, the Designer of Record ("DOR") that will be responsible for each area of design. One DOR may be responsible for more than one area. Listed, Professional Registered, DOR(s) shall account for all areas of design disciplines shall be accounted for by a listed. The DOR's shall stamp, sign, and date each design drawing and other design deliverables under their responsible discipline at each design submittal stage (see contract clause Registration of Designers). If the deliverables are not ready for release for construction, identify them as "preliminary" or "not for release for construction" or by using some other appropriate designation. The DOR(s) shall also be responsible for maintaining the integrity of the design and for compliance with the contract requirements through construction and documentation of the as-built condition by coordination, review and approval of extensions of design, material, equipment and other construction submittals, review and approval or disapproval of requested deviations to the accepted design or to the contract, coordination with the Government of the above activities, and by performing other typical professional designer responsibilities.

## **2.0 PRODUCTS (Not Applicable)**

## **3.0 EXECUTION**

### **3.1. PRE-WORK ACTIVITIES & CONFERENCES**

#### **3.1.1. Design Quality Control Plan**

Submit for Government acceptance, a Design Quality Control Plan in accordance with Section 01 45 04.00 10 CONTRACTOR QUALITY CONTROL before design may proceed.

#### **3.1.2. Post Award Conference**

3.1.2.1. The government will conduct a post award contract administration conference at the project site, as soon as possible after contract award. This will be coordinated with issuance of the contract notice to proceed (NTP). The Contractor and major sub-contractor representatives shall participate. All designers need not attend this first meeting. Government representatives will include COE project delivery team members, facility users, facility command representatives, and installation representatives. The Government will provide an agenda, meeting goals, meeting place, and meeting time to participants prior to the meeting.

3.1.2.2. The post award conference shall include determination and introduction of contact persons, their authorities, contract administration requirements, discussion of expected project progress processes, and coordination of subsequent meetings for quality control (see Section 01 45 04.00 10 CONTRACTOR QUALITY CONTROL), Partnering (see below and SCR: Partnering), and the initial design conference (see below).

3.1.2.3. The government will introduce COE project delivery team members, facility users, facility command representatives, and installation representatives. The DB Contractor shall introduce major subcontractors, and other needed staff. Expectations and duties of each person shall be defined for all participants. A meeting roster shall be developed and distributed by the government with complete contact information including name, office, project role, phone, mailing and physical address, and email address.

### 3.1.3. Partnering & Project Progress Processes

3.1.3.1. The initial Partnering conference may be scheduled and conducted at any time with or following the post award conference. The Government proposes to form a partnership with the DB Contractor to develop a cohesive building team. This partnership will involve the COE project delivery team members, facility users, facility command representatives, installation representatives, Designers of Record, major subcontractors, contractor quality control staff, and contractor construction management staff. This partnership will strive to develop a cooperative management team drawing on the strengths of each team member in an effort to achieve a quality project within budget and on schedule. This partnership will be bilateral in membership and participation will be totally voluntary. All costs, excluding labor and travel expenses, shall be shared equally between the Government and the Contractor. The Contractor and Government shall be responsible for their own labor and travel costs. Normally, partnering meetings will be held at or in the vicinity of the project installation.

3.1.3.2. As part of the partnering process, the Government and Contractor shall develop, establish, and agree to comprehensive design development processes including conduct of conferences, expectations of design development at conferences, fast-tracking, design acceptance, Structural Interior Design (SID)/ Furniture, Fixtures & Equipment (FF&E) design approval, project closeout, etc. The government will explain contract requirements and the DB Contractor shall review their proposed project schedule and suggest ways to streamline processes.

### 3.1.4. Initial Design Conference

The initial design conference may be scheduled and conducted at the project installation any time after the post award conference, although it is recommended that the partnering process be initiated with or before the initial design conference. Any design work conducted after award and prior to this conference should be limited to site and is discouraged for other items. All Designers of Record shall participate in the conference. The purpose of the meeting is to introduce everyone and to make sure any needs the contractor has are assigned and due dates established as well as who will get the information. See also Attachment F, BUILDING INFORMATION MODELING REQUIREMENTS for discussion concerning the BIM Implementation Plan demonstration at this meeting. The DB Contractor shall conduct the initial design conference.

### 3.1.5. Pre-Construction Conference

Before starting construction activities, the Contractor and Government will jointly conduct a pre-construction administrative conference to discuss any outstanding requirements and to review local installation requirements for start of construction. It is possible there will be multiple Pre-Construction Conferences based on the content of the design packages selected by the Contractor. The Government will provide minutes of this meeting to all participants.

## 3.2. STAGES OF DESIGN SUBMITTALS AND OVER THE SHOULDER PROGRESS REVIEWS

The stages of design submittals described below define Government expectations with respect to process and content. The Contractor shall determine how to best plan and execute the design and review process for this project, within the parameters listed below. As a minimum, the Government expects to see at least one interim design submittal, at least one final design submittal before construction of a design package may proceed and at least one Design Complete submittal that documents the accepted design. The Contractor may sub-divide the design into separate packages for each stage of design and may proceed with construction of a package after the Government accepts the final design for that package. See discussion on waivers to submission of one or more intermediate design packages where the parties partner during the design process. See also Attachment F, BUILDING INFORMATION MODELING REQUIREMENTS for discussion concerning BIM and the various stages of design submittals and over-the-shoulder progress reviews.

### 3.2.1. Site/Utilities

To facilitate fast-track design-construction activities the contractor may submit a final (100%) site and utility design as the first design submittal or it may elect to submit interim and final site and utility design submittals as explained below. Following review, resolution, and incorporation of all Government comments, and submittal of a satisfactory set of site/utility design documents, after completing all other pre-construction requirements in this contract and after the pre-construction meeting, the Government will allow the Contractor to proceed with site development activities, including demolition where applicable, within the parameters set forth in the accepted design submittal. For the first site and utility design submission, whether an interim or final, the submittal review, comment, and resolution times from this specification apply, except that the Contractor shall allow the Government a 14 calendar day review period, exclusive of mailing time. No on-site construction activities shall begin prior to written Government clearance to proceed.

### 3.2.2. Interim Design Submittals

The Contractor may submit either a single interim design for review, representing a complete package with all design disciplines, or split the interim design into smaller, individual design packages as it deems necessary for fast-track construction purposes. As required in Section 01 32 01.00 10 PROJECT SCHEDULE, the Contractor shall schedule its design and construction packaging plan to meet the contract completion period. This submission is the Government's primary opportunity to review the design for conformance to the solicitation and to the accepted contract proposal and to the Building Codes at a point where required revisions may be still made, while minimizing lost design effort to keep the design on track with the contract requirements. The requirements for the interim design review submittals and review conferences are described hereinafter. This is not necessarily a hold point for the design process; the Contractor may designate the interim design submittal(s) as a snapshot and proceed with design development at its own risk. See below for a waiver, where the parties establish an effective over-the-shoulder progress review procedure through the partnering process that would eliminate the need for or expedite a formal intermediate design review on one or more individual design packages.

### 3.2.3. Over-the-Shoulder Progress Reviews

To facilitate a streamlined design-build process, the Government and the Contractor may agree to one-on-one reviewer or small group reviews, electronically, on-line (if available within the Contractor's standard design practices) or at the Contractor's design offices or other agreed location, when practicable to the parties. The Government and Contractor will coordinate such reviews to minimize or eliminate disruptions to the design process. Any data required for these reviews shall normally be provided in electronic format, rather than in hard copy. If the Government and Contractor establish and implement an effective, mutually agreeable partnering procedure for regular (e.g., weekly) over-the shoulder review procedures that allow the Government reviewers the opportunity to keep fully informed of the progress, contents, design intent, design documentation, etc. of the design package, the Government will agree to waive or to expedite the formal intermediate design review period for that package. The Contractor shall still be required to submit the required intermediate design documentation, however the parties may agree to how that material will be provided, in lieu of a formal consolidated submission of the package. It should be noted that Government funding is extremely limited for non-local travel by design reviewers, so the maximum use of virtual teaming methods must be used. Some possible examples include electronic file sharing, interactive software with on-line or telephonic conferencing, televideo conferencing, etc. The Government must still perform its Code and Contract conformance reviews, so the Contractor is encouraged to partner with the reviewers to find ways to facilitate this process and to facilitate meeting or bettering the design-build schedule. The Contractor shall maintain a fully functional configuration management system as described herein to track design revisions, regardless of whether or not there is a need for a formal intermediate design review. The formal intermediate

review procedures shall form the contractual basis for the official schedule, in the event that the partnering process determines that the formal intermediate review process to be best suited for efficient project execution. However, the Government pledges to support and promote the partnering process to work with the Contractor to find ways to better the design schedule.

#### 3.2.4. Final Design Submissions

This submittal is required for each design package prior to Government acceptance of that design package for construction. The requirements for the final design submittal review conferences and the Government's acceptance for start of construction are described herein after.

#### 3.2.5. Design Complete Submittals

After the final design submission and review conference for a design package, revise the design package to incorporate the comments generated and resolved in the final review conferences, perform and document a back-check review and submit the final, design complete documents, which shall represent released for construction documents. The requirements for the design complete submittals are described hereinafter.

#### 3.2.6. Holiday Periods for Government Review or Actions

Do not schedule meetings, Government reviews or responses during the last two weeks of December or other designated Government Holidays (including Friday after Thanksgiving). Exclude such dates and periods from any durations specified herein for Government actions.

#### 3.2.7. Late Submittals and Reviews

If the Contractor cannot meet its scheduled submittal date for a design package, it must revise the proposed submittal date and notify the government in writing, at least one (1) week prior to the submittal, in order to accommodate the Government reviewers' other scheduled activities. If a design submittal is over one (1) day late in accordance with the latest revised design schedule, or if notification of a proposed design schedule change is less than seven (7) days from the anticipated design submission receipt date, the Government review period may be extended up to seven (7) days due to reviewers' schedule conflicts. If the Government is late in meeting its review commitment and the delay increases the Contractor's cost or delays completion of the project, the Suspension of Work and Defaults clauses provide the respective remedy or relief for the delay.

### 3.3. DESIGN CONFIGURATION MANAGEMENT

#### 3.3.1. Procedures

Develop and maintain effective, acceptable design configuration management (DCM) procedures to control and track all revisions to the design documents after the Interim Design Submission through submission of the As-Built documents. During the design process, this will facilitate and help streamline the design and review schedule. After the final design is accepted, this process provides control of and documents revisions to the accepted design (See Special Contract Requirement: Deviating From the Accepted Design). The system shall include appropriate authorities and concurrences to authorize revisions, including documentation as to why the revision must be made. The DCM data shall be available to the Government reviewers at all times. The Contractor may use its own internal system with interactive Government concurrences, where necessary or may use the Government's "DrChecks Design Review and Checking System" (see below and Attachment C).

#### 3.3.2. Tracking Design Review Comments

Although the Contractor may use its own internal system for overall design configuration management, the Government and the Contractor shall use the DrChecks Design Review and Checking System to initiate, respond to, resolve and track Government design compliance review comments. This system may be useful for other data which needs to be interactive or otherwise available for shared use and retrieval. See Attachment C for details on how to establish an account and set-up the DrChecks system for use on the project.

#### 3.3.3. Design and Code Checklists



Develop and complete various discipline-specific checklists to be used during the design and quality control of each submittal. Submit these completed checklists with each design submittal, as applicable, as part of the project documentation. See Section 01 45 04.00 10 Contractor Quality Control, Attachment D for a Sample Fire Protection and Life Safety Code review checklist and Attachment E for LEED SUBMITTALS.

### 3.4. INTERIM DESIGN REVIEWS AND CONFERENCES

#### 3.4.1. General

At least one interim design submittal, review and review conference is required for each design package (except that, per paragraph 3.2.1, the Contractor may skip the interim design submission and proceed directly to final design on the sitework and utilities package). The DB Contractor may include additional interim design conferences or over-the-shoulder reviews, as needed, to assure continued government concurrence with the design work. Include the interim submittal review periods and conferences in the project schedule and indicate what part of the design work is at what percentage of completion. The required interim design conferences shall be held when interim design requirements are reached as described below. See also Paragraph: **Over-the-Shoulder Progress Reviews** for a waiver to the formal interim design review.

#### 3.4.2. Procedures

After receipt of an Interim Design submission, allow the Government fourteen (14) calendar days after receipt of the submission to review and comment on the interim design submittal. For smaller design packages, especially those that involve only one or a few separate design disciplines, the parties may agree on a shorter review period or alternative review methods (e.g., over-the-shoulder or electronic file sharing), through the partnering process. For each interim design review submittal, the COR will furnish, to the Contractor, a single consolidated, validated listing of all comments from the various design sections and from other concerned agencies involved in the review process using the DrChecks Design Review and Checking System. The review will be for conformance with the technical requirements of the solicitation and the Contractor's RFP proposal. If the Contractor disagrees technically with any comment or comments and does not intend to comply with the comment, he/she must clearly outline, with ample justification, the reasons for noncompliance within five (5) days after receipt of these comments in order that the comment can be resolved. Furnish disposition of all comments, in writing, through DrChecks. The Contractor is cautioned that if it believes the action required by any comment exceeds the requirements of this contract, that it should take no action and notify the COR in writing immediately. The Interim Review conference will be held for each design submittal at the installation. Bring the personnel that developed the design submittal to the review conference. The conference will take place the week after the receipt of the comments by the Contractor. For smaller fast-track packages that involve only a few reviewers, the parties may agree to alternative conferencing methods, such as teleconferencing, or televideo, where available, as determined through Partnering.

#### 3.4.3. Conference Documentation

3.4.3.1. In order to facilitate and accelerate the Government code and contract conformance reviews, identify, track resolution of and maintain all comments and action items generated during the design process and make this available to the designers and reviewers prior to the Interim and subsequent design reviews.

3.4.3.2. The DB Contractor shall prepare meeting minutes and enter final resolution of all comments into DrChecks. Copies of comments, annotated with comment action agreed on, will be made available to all parties before the conference adjourns. Unresolved problems will be resolved by immediate follow-on action at the end of conferences. Incorporate valid comments. The Government reserves the right to reject design document submittals if comments are significant. Participants shall determine if any comments are critical enough to require further design development prior to government concurrence. Participants shall also determine how to proceed in order to obtain government concurrence with the design work presented.

### 3.5. INTERIM DESIGN REQUIREMENTS

Interim design deliverables shall include drawings, specifications, and design analysis for the part of design that the Contractor considers ready for review.

#### 3.5.1. Drawings

Include comments from any previous design conferences incorporated into the documents to provide an interim design for the "part" submitted.

### 3.5.2. Design Analyses

3.5.2.1. The designers of record shall prepare and present design analyses with calculations necessary to substantiate and support all design documents submitted. Address design substantiation required by the applicable codes and references and pay particular attention to the following listed items:

3.5.2.2. For parts including sitework, include site specific civil calculations.

3.5.2.3. For parts including structural work, include structural calculations.

- (a) Identify all loads to be used for design.
- (b) Describe the method of providing lateral stability for the structural system to meet seismic and wind load requirements. Include sufficient calculations to verify the adequacy of the method.
- (c) Provide calculations for all principal roof, floor, and foundation members and bracing and secondary members.
- (d) Provide complete seismic analyses for all building structural, mechanical, electrical, architectural, and building features as dictated by the seismic zone for which the facility is being constructed.
- (e) Computer generated calculations must identify the program name, source, and version. Provide input data, including loads, loading diagrams, node diagrams, and adequate documentation to illustrate the design. The schematic models used for input must show, as a minimum, nodes/joints, element/members, materials/properties, and all loadings, induced settlements/deflections, etc., and a list of load combinations. Include an output listing for maximum/minimum stresses/forces and deflections for each element and the reactions for each loading case and combination.
- (f) See also the Security (Anti-Terrorism) requirements below for members subject to Anti-Terrorist Force Protection (ATFP) and Progressive Collapse requirements.
- (g) Fully coordinate and integrate the overall structural design between two different or interfacing construction types, such as modular and stick-built or multistory, stacked modular construction. Provide substantiation of structural, consolidation/settlement analysis, etc., as applicable, through the interfaces.

3.5.2.4. For Security (Anti-Terrorism): Provide a design narrative and calculations where applicable, demonstrating compliance with each of the 22 standards in UFC 4-010-01, which includes Design of Buildings to Resist Progressive Collapse (use the most recent version of UFC 4-023-03, regardless of references to any specific version in UFC 4-010-01). Where sufficient standoff distance is not being provided, show calculations for blast resistance of the structural system and building envelope. Show complete calculations for members subjected to ATFP loads, e.g., support members of glazed items (jambes, headers, sills) connections of windows to support members and connections of support members to the rest of the structure. For 3 story and higher buildings, provide calculations to demonstrate compliance with progressive collapse requirements.

3.5.2.5. For parts including architectural work, include building floor area analysis.

3.5.2.6. For parts including mechanical work, include HVAC analysis and calculations. Include complete design calculations for mechanical systems. Include computations for sizing equipment, compressed air systems, air duct design, and U-factors for ceilings, roofs and exterior walls and floors. Contractor shall employ commercially available energy analysis techniques to determine the energy performance of all passive systems and features. Use of hourly energy load computer simulation is required (see paragraph 3.5.5.2 for list of acceptable software). Based on the results of calculations, provide a complete list of the materials and equipment proposed with the manufacturer's published cataloged product installation specifications and roughing-in data.

3.5.2.7. For parts including life safety, include building code analysis and sprinkler and other suppression systems. Notwithstanding the requirements of the Codes, address the following:

- (a) A registered fire protection engineer (FPE) must perform all fire protection analyses. Provide the fire protection engineer's qualifications. See Section 01 10 00, paragraph 5 for qualifications.

- (b) Provide all references used in the design including Government design documents and industry standards used to generate the fire protection analysis.
- (c) Provide classification of each building in accordance with fire zone, building floor areas and height and number of stories.
- (d) Provide discussion and description of required fire protection requirements including extinguishing equipment, detection equipment, alarm equipment and water supply. Alarm and detection equipment shall interface to requirements of Electronic Systems.
- (e) Provide hydraulic calculations based on water flow test for each sprinkler system to insure that flow and pressure requirements can be met with current water supply. Include copies of Contractor's water flow testing done to certify the available water source.

3.5.2.8. For parts including plumbing systems:

- (a) List all references used in the design.
- (b) Provide justification and brief description of the types of plumbing fixtures, piping materials and equipment proposed for use.
- (c) Detail calculations for systems such as sizing of domestic hot water heater and piping; natural gas piping; LP gas piping and tanks, fuel oil piping and tanks, etc., as applicable.
- (d) When the geotechnical report indicates expansive soils are present, indicate in the first piping design submittal how piping systems will be protected against damage or backfall/backflow due to soil heave (from penetration of slab to the 5 foot building line).

3.5.2.9. For elevator systems:

- (a) List all criteria codes, documents and design conditions used.
- (b) List any required permits and registrations for construction of items of special mechanical systems and equipment.

3.5.2.10. For parts including electrical work, include lighting calculations to determine maintained foot-candle levels, electrical load analysis and calculations, electrical short circuit and protective device coordination analysis and calculations and arc fault calculations.

3.5.2.11. For parts including telecommunications voice/data (including SIPRNET, where applicable), include analysis for determining the number and placement of outlets

3.5.2.12. For Cathodic Protection Systems, provide the following stamped report by the licensed corrosion engineer or NACE specialist with the first design submission. The designer must be qualified to engage in the practice of corrosion control of buried or submerged metallic surfaces. He/she must be accredited or certified by the National Association of Corrosion Engineers (NACE) as a NACE Accredited Corrosion Specialist or a NACE certified Cathodic Protection Specialist, or must be a registered professional engineer with a minimum of five years experience in corrosion control and cathodic protection. Clearly describe structures, systems or components in soil or water to be protected. Describe methods proposed for protection of each.

3.5.2.13. Air Barrier System: Provide a narrative of the design and installation requirements for the Air Barrier system. As part of the design quality control process an air barrier consultant shall review drawing details to assure that details of critical Air Barrier components are properly detailed and incorporated during the design drawings and process (i.e. window flashing details, penetration in air barrier details, door flashing details, roofing/ceiling barrier interface details and etc.). Furnish the Government written review details and results.

3.5.3. Geotechnical Investigations and Reports:

3.5.3.1. The contractor's licensed geotechnical engineer shall prepare a final geotechnical evaluation report, to be submitted along with the first foundation design submittal. Make this information available as early as possible during the over-the-shoulder progress review process. Summarize the subsurface conditions and provide recommendations for the design of appropriate utilities, foundations, floor slabs, retaining walls, embankments, and pavements. Include compaction requirements for fill and backfill under buildings, sidewalks, other structures and open areas. Recommend foundation systems to be used, allowable bearing pressures for footings, lateral load

resistance capacities for foundation systems, elevations for footings, grade beams, slabs, etc. Provide an assessment of post-construction settlement potential including total and differential. Provide recommendations regarding lateral earth pressures (active, at-rest, passive) to be used in the design of retaining walls. Include the recommended spectral accelerations and Site Class for seismic design along with an evaluation of any seismic hazards and recommendations for mitigation, if required. Include calculations to support the recommendations for bearing capacity, settlement, and pavement sections. Include supporting documentation for all recommended design parameters such as Site Class, shear strength, earth pressure coefficients, friction factors, subgrade modulus, California Bearing Ratio (CBR), etc. Provide earthwork recommendations, expected frost penetration, expected groundwater levels, recommendations for dewatering and groundwater control and the possible presence of any surface or subsurface features that may affect the construction of the project such as sinkholes, boulders, shallow rock, old fill, old structures, soft areas, or unusual soil conditions. Include pH tests, salinity tests, resistivity measurements, etc., required to design corrosion control and grounding systems. Include the raw field data. Arrange a meeting with the Government subsequent to completion and evaluation of the site specific geotechnical exploration to outline any differences encountered that are inconsistent with the Government provided preliminary soils information. Clearly outline differences which require changes in the foundation type, or pavement and earthwork requirements from that possible and contemplated using the Government furnished preliminary soils investigation, which result in a change to the design or construction. Any equitable adjustment is subject to the provisions of the contract's Differing Site Conditions Clause.

3.5.3.2. Vehicle Pavements: The Contractor's geotechnical report shall contain flexible and rigid pavement designs, as applicable for the project, including design CBR and modulus of subgrade reaction and the required compaction effort for subgrades and pavement layers. Provide Information on the types of base course materials available in the area and design strengths.

3.5.3.3. The Contractor and the professional geotechnical engineer consultant shall certify in writing that the design of the project has been developed consistent with the Contractor's final geotechnical report. The certification shall be stamped by the consulting professional geotechnical engineer and shall be submitted with the first design submission. If revisions are made to the initial design submission, a new certification shall be provided with the final design submission.

#### 3.5.4. LEED Documentation:

Assign a LEED Accredited Professional, responsible to track LEED planning, performance and documentation for each LEED credit through construction closeout. Incorporate LEED credits in the plans, specifications and design analyses. Develop LEED supporting documentation as a separable portion of the Design Analysis and provide with each required design submittal. Include the LEED Project checklist for each non-exempt facility (one checklist may be provided for multiple facilities in accordance with the LEED-NC Application Guide for Multiple Buildings and On-Campus Building Projects and the LEED SUBMITTALS (Attachment E, herein) with each submittal. Final design submittal for each portion of the work must include all required design documentation relating to that portion of work (example - all site credit design documents with final site design). Submittal requirements are as indicated in Attachment E, LEED SUBMITTALS. Submit all documentation indicated on Attachment E as due at final design at final design submittal (for fast-track projects with multiple final design submittals, this shall be at the last scheduled final design submittal). All project documentation related to LEED shall conform to USGBC requirements for both content and format, including audit requirements and be separate from other design analyses. Maintain and update the LEED documentation throughout project progress to construction closeout and shall compile product data, receipts, calculations and other data necessary to substantiate and support all credits claimed. The Government may audit any or all individual credits. Audit documentation is not required to be submitted unless requested. These requirements apply to all projects. If the project requires the Contractor to obtain USGBC certification, the Contractor shall also be responsible for obtaining USGBC certification and shall provide written evidence of certification with the construction closeout LEED documentation submittal. Install the USGBC building plaque at the location indicated by the Government upon receipt. If Contractor obtains USGBC interim design review, submit the USGBC review to the Government within 30 days of receipt for information only.

3.5.4.1. LEED Documentation for Technology Solution Set. If the Solicitation provides a Prescriptive Technology Solution Set, use of the Technology Solution set has no effect on LEED documentation requirements. Provide all required LEED documentation, including energy analysis, in accordance with LEED requirements when using the Technology Solution Set.

#### 3.5.5. Energy Conservation:

3.5.5.1. Refer to Section 01 10 00, Paragraph 5. Interim and Final Design submittals shall demonstrate that each building including the building envelope, HVAC systems, service water heating, power, and lighting systems meet the Mandatory Provisions and the Prescriptive Path requirements of ASHRAE 90.1. Use Compliance Documentation forms available from ASHRAE and included in the ASHRAE 90.1 User's Manual for this purpose. The Architectural Section of the Design Analysis shall include completed forms titled "Building Envelope Compliance Documentation Parts I and II". The Heating Ventilating and Air Conditioning (HVAC) Section of the Design Analysis shall include a completed form titled "HVAC Simplified Approach Option - Part I" if this approach is allowed by the Standard. Otherwise, the HVAC Section of the Design Analysis shall include completed forms titled "HVAC Mandatory Provisions - Part II" and "HVAC Prescriptive Requirements - Part III". The Plumbing Section of the Design Analysis shall include a completed form titled "Service Water Heating Compliance Documentation". The Electrical Section of the Design Analysis shall include an explanatory statement on how the requirements of ASHRAE 90.1-2004 Chapter 8 Power were met. The Electrical Section of the Design Analysis shall also include a completed form titled "Lighting Compliance Documentation".

3.5.5.2. Interim and Final Design submittals which address energy consuming systems, (heating, cooling, service hot water, lighting, power, etc.) must also include calculations in a separate Energy Conservation Section of the Design Analysis which demonstrate and document (a) the baseline energy consumption for the facility or facilities under contract, that would meet the requirements of ANSI/ASHRAE/IESNA Standard 90.1 and (b) the energy consumption of the facility or facilities under contract utilizing the materials and methods required by this construction contract. Use the USGBC Energy and Atmosphere (EA) Credit 1 compliance template / form or an equivalently detailed form for documenting compliance with the energy reduction requirements. This template / form is titled PERFORMANCE RATING METHOD and is available when the project is registered for LEED. The calculation methodology used for this documentation and analysis shall follow the guidelines set forth in Appendix G of ASHRAE 90.1, with two exceptions: a) receptacle and process loads may be omitted from the calculation; and b) the definition of the terms in the formula for Percentage Improvement found in paragraph G1.2 are modified as follows: Baseline Building Performance shall mean the annual energy consumption calculated for a building design intended for use as a baseline for rating above standard design meeting the minimum requirements of the energy standard, and Proposed Building Performance shall mean annual energy consumption calculated for the proposed building design intended for construction. This calculation shall address all energy consuming systems in a single integrated methodology. Include laboratory fume hoods and kitchen ventilation loads in the energy calculation. They are not considered process loads. Individual calculations for heating, cooling, power, lighting, power, etc. systems will not be acceptable. The following building simulation software is acceptable for use in calculating building energy consumption: Hourly Analysis Program (HAP) by Carrier Corp., TRACE 700 by Trane Corp., DOE-2 by US Department of Energy, EnergyPlus by DOD/DOE.

### 3.5.6. Specifications

Specifications may be any one of the major, well known master guide specification sources (use only one source) such as MASTERSPEC from the American Institute of Architects, SPECTEXT from Construction Specification Institute or Unified Facility Guide Specifications (UFGS using MASTERFORMAT 2004 numbering system), etc. (including specifications from these sources). Manufacturers' product specifications, utilizing CSI's Manu-Spec, three part format may be used in conjunction with the selected specifications. The designers of record shall edit and expand the appropriate Specifications to insure that all project design requirements, current code requirements, and regulatory requirements are met. Specifications shall clearly identify, where appropriate, specific products chosen to meet the contract requirements (i.e., manufacturers' brand names and model numbers or similar product information).

### 3.5.7. Building Rendering

Present and provide a draft color computer, artist, or hand drawn rendering with the conceptual design submittal of the building exterior. Perspective renderings shall include a slightly overhead view of the entire building to encompass elevations and the roof configuration of the building. After Government review and acceptance, provide a final rendering, including the following:

Three (3) 18" x 24" color prints, framed and matted behind glass with project title underneath the print.

One (1) Image file (high resolution) in JPG format on CD for those in the submittal distribution list.

### 3.5.8. Interim Building Design Contents

The following list represents what the Government considers should be included in the overall completed design for a facility or project. It is not intended to limit the contractor from providing different or additional information as needed to support the design presented, including the required design analyses discussed above. As the Contractor develops individual design packages and submits them for Interim review, include as much of the applicable information for an individual design package as is developed at the Interim design level for review purposes. These pieces shall be developed as the design progresses toward the design complete stage.

#### 3.5.8.1. Lawn and Landscaping Irrigation System

#### 3.5.8.2. Landscape, Planting and Turfing

#### 3.5.8.3. Architectural

- (a) Design Narrative
- (b) Architectural Floor Plans, Typical Wall and Roof Sections, Elevations
- (c) Finish schedule
- (d) All required equipment
- (e) Special graphics requirements
- (f) Door and Window Schedules
- (g) Hardware sets using BHMA designations
- (h) Composite floor plan showing all pre-wired workstations
- (i) Structural Interior Design (SID) package: See ATTACHMENT A for specific requirements
- (j) Furniture, Fixtures & Equipment (FF&E) design package: See ATTACHMENT B for specific requirements
- (k) Air Barrier Design: Details of all Air Barrier components, (i.e. window flashing details, penetrations in air barrier details, door flashing details, roofing/ceiling barrier interface details and etc.)

#### 3.5.8.4. Structural Systems. Include:

- (a) Drawings showing principal members for roof and floor framing plans as applicable
- (b) Foundation plan showing main foundation elements where applicable
- (c) Typical sections for roof, floor, and foundation conditions

#### 3.5.8.5. Plumbing Systems

- (a) Show locations and general arrangement of plumbing fixtures and major equipment
- (b) Plan and isometric riser diagrams of all areas including hot water, cold water, waste and vent piping. Include natural gas (and meter as required), (natural gas and meter as required), (LP gas), (fuel oil) and other specialty systems as applicable.
- (c) Include equipment and fixture connection schedules with descriptions, capacities, locations, connection sizes and other information as required

#### 3.5.8.6. HVAC Systems

- (a) Mechanical Floor Plans: The floor plans shall show all principle architectural features of the building which will affect the mechanical design. The floor plans shall also show the following:
  - (1) Room designations.
  - (2) Mechanical legend and applicable notes.
  - (3) Location and size of all ductwork and piping.
  - (4) Location and capacity of all terminal units (i.e., registers, diffusers, grilles, hydronic baseboards).
  - (5) Pre-Fabricated Paint Spray Booth (where applicable to project scope)
  - (6) Paint Preparation Area (where applicable to project scope)

- (7) Exhaust fans and specialized exhaust systems.
- (8) Thermostat location.
- (9) Location of heating/cooling plant (i.e., boiler, chiller, cooling tower, etc).
- (10) Location of all air handling equipment.
- (11) Air balancing information.
- (12) Flue size and location.
- (13) Piping diagram for forced hot water system (if used).
- (b) Equipment Schedule: Provide complete equipment schedules. Include:
  - (1) Capacity
  - (2) Electrical characteristics
  - (3) Efficiency (if applicable)
  - (4) Manufacturer's name
  - (5) Optional features to be provided
  - (6) Physical size
  - (7) Minimum maintenance clearances
- (a) Details: Provide construction details, sections, elevations, etc., only where required for clarification of methods and materials of design.
- (b) HVAC Controls: Submit complete HVAC controls equipment schedules, sequences of operation, wiring and logic diagrams, Input/Output Tables, equipment schedules, and all associated information. See the Statement of Work for additional specific requirements.

#### 3.5.8.7. Fire Protection and Life Safety.

- (a) Provide plan for each floor of each building that presents a compendium of the total fire protection features being incorporated into the design. Include the following types of information:
  - (1) The location and rating of any fire-resistive construction such as occupancy separations, area separations, exterior walls, shaft enclosures, corridors, stair enclosures, exit passageways, etc.
  - (2) The location and coverage of any fire detection systems
  - (3) The location and coverage of any fire suppression systems (sprinkler risers, standpipes, etc.)
  - (4) The location of any other major fire protection equipment
  - (5) Indicate any hazardous areas and their classification
  - (6) Schedule describing the internal systems with the following information: fire hazard and occupancy classifications, building construction type, GPM/square foot sprinkler density, area of operation and other as required
- (b) Working plans and all other materials submitted shall meet NFPA 13 requirements, with respect to required minimum level of detail.

#### 3.5.8.8. Elevators. Provide:

- (a) Description of the proposed control system
- (b) Description, approximate capacity and location of any special mechanical equipment for elevators.

#### 3.5.8.9. Electrical Systems.

- (a) Electrical Floor Plan(s): Show all principle architectural features of the building which will affect the electrical design. Show the following:
  - (1) Room designations.

- (2) Electrical legend and applicable notes.
- (3) Lighting fixtures, properly identified.
- (4) Switches for control of lighting.
- (5) Receptacles.
- (6) Location and designation of panelboards. Clearly indicate type of mounting required (flush or surface) and reflect accordingly in specifications.
- (7) Service entrance (conduit and main disconnect).
- (8) Location, designation and rating of motors and/or equipment which requires electrical service. Show method of termination and/or connection to motors and/or equipment. Show necessary junction boxes, disconnects, controllers (approximate only), conduit stubs, and receptacles required to serve the motor and/or equipment.
- (b) Building Riser Diagram(s) (from pad-mounted transformer to unit load center panelboard): Indicate the types and sizes of electrical equipment and wiring. Include grounding and metering requirements.
- (c) Load Center Panelboard Schedule(s): Indicate the following information:
  - (1) Panelboard Characteristics (Panel Designation, Voltage, Phase, Wires, Main Breaker Rating and Mounting).
  - (2) Branch Circuit Designations.
  - (3) Load Designations.
  - (4) Circuit Breaker Characteristics. (Number of Poles, Trip Rating, AIC Rating)
  - (5) Branch Circuit Connected Loads (AMPS).
  - (6) Special Features
- (d) Lighting Fixture Schedule(s): Indicate the following information:
  - (1) Fixture Designation.
  - (2) General Fixture Description.
  - (3) Number and Type of Lamp(s).
  - (4) Type of Mounting.
  - (5) Special Features.
- (e) Details: Provide construction details, sections, elevations, etc. only where required for clarification of methods and materials of design.

3.5.8.10. Electronic Systems including the following responsibilities:

- (a) Fire Detection and Alarm System. Design shall include layout drawings for all devices and a riser diagram showing the control panel, annunciator panel, all zones, radio transmitter and interfaces to other systems (HVAC, sprinkler, etc.)
- (b) Fire Suppression System Control. Specify all components of the Fire Suppression (FS) System in the FS section of the specifications. Clearly describe how the system will operate and interact with other systems such as the fire alarm system. Include a riser diagram on the drawings showing principal components and interconnections with other systems. Include FS system components on drawing legend. Designate all components shown on floor plans "FS system components" (as opposed to "Fire Alarm components"). Show location of FS control panels, HVAC control devices, sensors, and 120V power panel connections on floor plans. Indicate zoning of areas by numbers (1, 2, 3) and detectors sub-zoned for cross zoning by letter designations (A and B). Differentiate between ceiling mounted and under floor detectors with distinct symbols and indicate sub-zone of each.
- (c) Public Address System
- (d) Special Grounding Systems. Completely reflect all design requirements in the specifications and drawings. Specifications shall require field tests (in the construction phase), witnessed by the Government, to determine the effectiveness of the grounding system. Include drawings showing existing construction, if any.
- (e) Cathodic Protection.



- (f) Intrusion Detection, Card Access System
- (g) Central Control and Monitoring System
- (h) Mass Notification System
- (i) Electrical Power Distribution Systems

3.5.8.11. Separate detailed Telecommunications drawings for Information Systems including the following responsibilities:

- (a) Telecommunications Cabling
- (b) Supporting Infrastructure
- (a) Outside Plant (OSP) Cabling - Campus or Site Plans - Exterior Pathways and Inter-Building Backbones
  - (a) Include a layout of the voice/data outlets (including voice only wall & pay phones) on telecommunication floor plan drawing, location of SIPRNET data outlets (where applicable), and a legend and symbol definition to indicate height above finished floor. Show size of conduit and cable type and size on Riser Diagram. Do not show conduit runs between backboard and outlets on the floor plans. Show underground distribution conduit and cable with sizing from point of presence to entrance facility of building.
  - (b) Layout of complete building per floor - Serving Zone Boundaries, Backbone Systems, and Horizontal Pathways including Serving Zones Drawings - Drop Locations and Cable ID's
  - (c) Communication Equipment Rooms - Plan Views - Tech and AMEP/Elevations - Racks and Walls. Elevations with a detailed look at all telecomm rooms. Indicate technology layout (racks, ladder-racks, etc.), mechanical/electrical layout, rack elevation and backboard elevation. They may also be an enlargement of a congested area of T1 or T2 series drawing.

### 3.6. FINAL DESIGN REVIEWS AND CONFERENCES

A final design review and review conference will be held upon completion of final design at the project installation, or – where equipment is available - by video teleconference or a combination thereof, for any design package to receive Government acceptance to allow release of the design package for construction. For smaller separate design packages, the parties may agree on alternative reviews and conferences (e.g., conference calls and electronic file sharing, etc.) through the Partnering process. Include the final design conference in the project schedule and shall indicate what part of the design work is at 100% completion. The final design conference will be held after the Government has had seven (7) calendar days after receipt of the submission to review the final design package and supporting data. For smaller packages, especially those involving only one or a few design disciplines the parties may agree on a shorter period.

### 3.7. FINAL DESIGN REQUIREMENTS

Final design deliverables for a design package shall consist of 100% complete drawings, specifications, submittal register and design analyses for Government review and acceptance. The 100% design submission shall consist of drawings, specifications, updated design analyses and any permits required by the contract for each package submitted. In order to expedite the final design review, prior to the conference, ensure that the design configuration management data and all review comment resolutions are up-to-date. Include the 100% SID and 100% FF&E binders for government approval. The Contractor shall have performed independent technical reviews (ITR's) and back-checks of previous comment resolutions, as required by Section 01 45 04.00 10 CONTRACTOR QUALITY CONTROL, including providing documentation thereof. Use DrChecks or other acceptable comment tracking system during the ITR and submit the results with each final design package

#### 3.7.1. Drawings

3.7.1.1. Submit drawings complete with all contract requirements incorporated into the documents to provide a 100% design for each package submitted.

3.7.1.2. Prepare all drawings with the Computer-Aided Design and Drafting (CADD)/Computer-Aided Design (CAD) system, organized and easily referenced electronically, presenting complete construction information.

3.7.1.3. Drawings shall be complete. The Contractor is encouraged to utilize graphics, views, notes, and details which make the drawings easier to review or to construct but is also encouraged to keep such materials to those that are necessary.

3.7.1.4. Provide detail drawings that illustrate conformance with the contract. Include room finish schedules, corresponding color/finish/special items schedules, and exterior finish schedules that agree with the submitted SID binders.

3.7.1.5. The design documents shall be in compliance with the latest version of the A/E/C CAD Standard, available at <https://cadbim.usace.army.mil/CAD>. Use the approved vertical Corps of Engineers title blocks and borders on all drawings with the appropriate firm name included within the title block area.

3.7.1.6. CAD System and Building Information Modeling (BIM) (NOTE: If this is a Single Award or Multiple Award, Indefinite Delivery/Indefinite Quantity Contract, this information will be provided for each task order.)

All CAD files shall be fully compatible with MicroStation V8 or higher. Save all design CAD files as MicroStation V8 or higher files. All submitted BIM Models and associated Facility Data shall be fully compatible with Bentley BIM file format and the USACE Bentley BIM v8 Workspace.

(a) CAD Data Final File Format: During the design development capture geo-referenced coordinates of all changes made to the existing site (facility footprint, utility line installations and alterations, roads, parking areas, etc) as a result of this contract. There is no mandatory methodology for how the geo-referenced coordinates will be captured, however, Engineering and Construction Bulletin No. 2006-15, Subject: Standardizing Computer Aided Design (CAD) and Geographic Information Systems (GIS) Deliverables for all Military Design and Construction Projects identifies the format for final as-built drawings and data sets to be delivered to the government. Close-out requirements at the as-built stage; require final geo-referenced GIS Database of the new facility along with all exterior modifications. The Government will incorporate this data set into the Installation's GIS Masterplan or Enterprise GIS System. See also, Section 01 78 02.00 10 Closeout Submittals.

(b) Electronic Drawing Files: In addition to the native CAD design files, provide separate electronic drawing files (in editable CAD format and Adobe Acrobat PDF version 7.0 or higher) for each project drawing.

(c) Each file (both CAD and PDF) shall represent one complete drawing from the drawing set, including the date, submittal phase, and border. Each drawing file shall be completely independent of any data in any other file, including fonts and shapes not included with the basic CAD software program utilized. Fonts that are not included as part of the default CAD software package installation or recognized as an allowable font by the A/E/C CAD Standard are not acceptable in delivered CAD files. All displayed graphic elements on all levels of the drawing files shall be part of the project drawing image. The drawing files shall not contain any graphic element that is not part of the drawing image.

(d) Deliver BIM Model and associated Facility Data files in their native format. At a minimum, BIM files shall address major architecture design elements, major structural components, mechanical systems and electrical/communication distribution and elements as defined in Attachment F. See Attachment F for additional BIM requirements.

(e) Drawing Index: Provide an index of drawings sheet in CAD as part of the drawing set, and an electronic list in Microsoft Excel of all drawings on the CD. Include the electronic file name, the sheet reference number, the sheet number, and the sheet title, containing the data for each drawing.

(f) Hard Copies: Plot submitted hard copy drawings directly from the "electronic drawing files" and copy for quantities and sizes indicated in the distribution list at the end of this specification section. The Designers of Record shall stamp, sign and date original hard copy sheets as Released For Construction, and provide copies for distribution from this set.

### 3.7.2. Design Analyses

3.7.2.1. The designers of record shall update, finalize and present design analyses with calculations necessary to substantiate and support all design documents submitted.

3.7.2.2. The responsible DOR shall stamp, sign and date the design analysis. Identify the software used where, applicable (name, version, vendor). Generally, provide design analyses, individually, in an original (file copy) and one copy for the assigned government reviewer.

3.7.2.3. All disciplines review the LEED design analysis in conjunction with their discipline-specific design analysis; include a copy of the separable LEED design analysis in all design analysis submittals.

3.7.2.4. Do not combine multi-disciplined volumes of design-analysis, unless multiple copies are provided to facilitate multiple reviewers (one copy per each separate design analysis included in a volume).

### 3.7.3. Specifications

Specifications shall be 100% complete and in final form.

### 3.7.4. Submittal Register

Prepare and update the Submittal Register and submit it with the 100% design specifications (see Specification Section 01 33 00, SUBMITTAL PROCEDURES) with each design package. Include the required submittals for each specification section in a design package in the submittal register.

### 3.7.5. Preparation of DD Form 1354 (Transfer of Real Property)

This form itemizes the types, quantities and costs of various equipment and systems that comprise the project, for the purpose of transferring the new construction project from the Corps Construction Division to the Installation's inventory of real property. The Government will furnish the DB Contractor's design manager a DD Form 1354 checklist to use to produce a draft Form 1354. Submit the completed checklist and prepared draft Form DD 1354 with the 100% design in the Design Analysis. The Corps will use these documents to complete the final DD 1354 upon completion of construction.

### 3.7.6. Acceptance and Release for Construction

3.7.6.1. At the conclusion of the Final Design Review (after resolutions to the comments have been agreed upon between DOR and Government reviewers), the Contracting Officer or the ACO will accept the Final Design Submission for the design package in writing and allow construction to start for that design package. The Government may withhold acceptance until all major corrections have been made or if the final design submission requires so many corrections, even though minor, that it isn't considered acceptably complete.

3.7.6.2. Government review and acceptance of design submittals is for contract conformance only and shall not relieve the Contractor from responsibility to fully adhere to the requirements of the contract, including the Contractor's accepted contract proposal, or limit the Contractor's responsibility of design as prescribed under Special Contract Requirement: "Responsibility of the Contractor for Design" or limit the Government's rights under the terms of the contract. The Government reserves the right to rescind inadvertent acceptance of design submittals containing contract deviations not separately and expressly identified in the submittal for Government consideration and approval.

## 3.8. DESIGN COMPLETE CONSTRUCTION DOCUMENT REQUIREMENTS

After the Final Design Submission and Review Conference and after Government acceptance of the Final Design submission, revise the design documents for the design package to incorporate the comments generated and resolved in the final review conference, perform and document a back-check review and submit the final, design complete documents. Label the final design complete documents "FOR CONSTRUCTION" or use similar language. In addition to the final drawings and specifications, the following deliverables are required for distribution and field use. The deliverable includes all documentation and supporting design analysis in final form, as well as the final review comments, disposition and the back-check. As part of the quality assurance process, the Government may perform a back-check of the released for construction documentation. Promptly correct any errors or omissions found during the Government back-check. The Government may withhold retainage from progress payments for work or materials associated with a final design package until this submittal has been received and the Government determines that it is complete.

## 3.9. SUBMITTAL DISTRIBUTION, MEDIA AND QUANTITIES

### 3.9.1. Submittal Distribution and Quantities

General: The documents which the Contractor shall submit to the Government for each submittal are listed and generally described in preceding paragraphs in this Section. Provide copies of each design submittal and design substantiation as follows (NOTE: If this is a Single Award or Multiple Award, Indefinite Delivery/Indefinite Quantity Contract, this information will be provided for each task order):

Activity and Address	Drawing Size (Full Size) <b>22 x 34</b> Full Sets/ *Partial Sets	Design Analyses & Specs Full Sets/ *Partial Sets	Drawing Size (Half Size) <b>11 x 17</b> Full Sets/ *Partial Sets	Non-BIM Data CD-ROM or DVD as Necessary (PDF & <u>.dgn</u> )	Furniture Submittal (Per Attachment B)	Structural Interior Design Submittal	BIM Data DVD (Per Attachment F)
Commander, U.S.Army Engineer District <b>CESAS</b>	2/0	6/0	6/0	6	1	1	1
Commander, U.S.Army Engineer District, Center of Standardization <b>CESAS, Brinson</b>	0/0	2/0	2/0	2	N/A	1	1
Installation	0/0	7/7	7/7	7	2	0	0
U.S.Army Corps of Engineers Construction Area Office	2/0	4/0	2/0	2	1	1	0
Information Systems Engineering Command (ISEC)	0/0	0/1	0/0	1	N/A	N/A	1
Other Offices	0/0	0/0	0/0	0	N/A	0	0

**\*NOTE: For partial sets of drawings, specifications and design analyses, see paragraph 3.9.3.3, below.**

**\*\*NOTE: When specified below in 3.9.2, furnish Installation copies of Drawings as paper copies, in lieu of the option to provide secure web-based submittals.**

### 3.9.2. Web based Design Submittals

Except for full or half-sized drawings for Installation personnel, as designated in the Table above, Web based design submittals will be acceptable as an alternative to the paper copies listed in the Table above, provided a single hard-copy PDF based record set is provided to the Contracting Officer for record purposes. Where the contract requires the Contractor to submit documents to permitting authorities, still provide those authorities paper copies (or in an alternate format where required by the authority). Web based design submittal information shall be provided with adequate security and availability to allow unlimited access those specifically authorized to Government reviewers while preventing unauthorized access or modification. File sizes must be of manageable size for reviewers to quickly download or open on their computers. As a minimum, drawings shall be full scale on American National Standards Institute (ANSI) D sheets (34" x 22"). In addition to the optional website, provide the

BIM data submission on DVD to each activity and address noted above in paragraph 3.9.1 for each BIM submission required in Attachment F.

### 3.9.3. Mailing of Design Submittals

3.9.3.1. Mail all design submittals to the Government during design and construction, using an overnight mailing service. The Government will furnish the Contractor addresses where each copy shall be mailed to after award of the contract (or individual task order if this is an indefinite delivery/indefinite quantity, task order contract). Mail the submittals to five (5) different addresses. Assemble drawing sheets, specs, design analyses, etc. into individual sets; do not combine duplicate pages from individual sets so that the government has to assemble a set.

3.9.3.2. Each design submittal shall have a transmittal letter accompanying it indicating the date, design percentage, type of submittal, list of items submitted, transmittal number and point of contact with telephone number.

3.9.3.3. Provide partial sets of drawings, specifications, design analyses, etc., as designated in the Table in paragraph 3.9.1, to those reviewers who only need to review their applicable portions of the design, such as the various utilities. The details of which office receives what portion of the design documentation will be worked out after award.

### 3.10. AS-BUILT DOCUMENTS

Provide as-built drawings and specifications in accordance with Section 01 78 02.00 10, CLOSEOUT SUBMITTALS. Update LEED design phase documentation during construction as needed to reflect construction changes and advancing project completion status (example - Commissioning Plan updates during construction phase) and include updated LEED documentation in construction closeout submittal.

## ATTACHMENT A STRUCTURAL INTERIOR DESIGN (SID) REQUIREMENTS

### 1.0 GENERAL INFORMATION

Structural Interior Design includes all building related elements and components generally part of the building itself, such as wall finishes, ceilings finishes, floor coverings, marker/bulletin boards, blinds, signage and built in casework. Develop the SID in conjunction with the furniture footprint.

### 2.0 STRUCTURAL INTERIOR DESIGN (SID) REQUIREMENTS FOR THE INTERIM AND FINAL DESIGN SUBMITTALS

#### 2.1. FORMAT AND SCHEDULE

Prepare and submit for approval an interior and exterior building finishes scheme for an interim design submittal. The DOR shall meet with and discuss the finish schemes with the appropriate Government officials prior to preparation of the schemes to be presented. Present original sets of the schemes to reviewers at an interim design conference.

At the conclusion of the interim phase, after resolutions to the comments have been agreed upon between DOR and Government reviewers, the Contractor may proceed to final design with the interior finishes scheme presented.

The SID information and samples are to be submitted in 8 ½" x 11" format using three ring binders with pockets on the inside of the cover. When there are numerous pages with thick samples, use more than one binder. Large D-ring binders are preferred to O-ring binders. Use page protectors that are strong enough to keep pages from tearing out. Anchor large or heavy samples with mechanical fasteners, Velcro, or double-faced foam tape rather than rubber cement or glue. Fold out items must have a maximum spread of 25 ½". Provide cover and spine inserts sheets identifying the document as "Structural Interior Design" package. Include the project title and location, project number, Contractor/A/E name and phone number(s), submittal stage and date.

Design submittal requirements include, but are not limited to:

#### 2.1.1. Narrative of the Structural Interior Design Objectives

The SID shall include a narrative that discusses the building related finishes. Include topics that relate to base standards, life safety, sustainable design issues, aesthetics, durability and maintainability, discuss the development and features as they relate to the occupants requirements and the building design.

#### 2.1.2. Interior Color Boards

Identify and key each item on the color boards to the contract documents to provide a clear indication of how and where each item will be used. Arrange finish samples to the maximum extent possible by room type in order to illustrate room color coordination. Label all samples on the color boards with the manufacturer's name, patterns and colors name and number. Key or code samples to match key code system used on contract drawings.

Material and finish samples shall indicate true pattern, color and texture. Provide photographs or colored photocopies of materials or fabrics to show large overall patterns in conjunction with actual samples to show the actual colors. Finish samples must be large enough to show a complete pattern or design where practical.

Color boards shall include but not be limited to original color samples of the following:

All walls finishes and ceiling finishes, including corner guards, acrylic wainscoting and wall guards/chair rail finishes

All tile information, including tile grout color and tile patterns.

- All flooring finishes, including patterns.
- All door, door frame finishes and door hardware finishes
- All signage, wall base, toilet partitions, locker finishes and operable/folding partitions and trim

- All millwork materials and finishes (cabinets, counter tops, etc.)
- All window frame finishes and window treatments (sills, blinds, etc.)

Color board samples shall reflect all actual finish textures, patterns and colors required as specified. Patterned samples shall be of sufficient size to adequately show pattern and its repeat if a repeat occurs.

#### 2.1.3. Exterior Color Boards

Prepare exterior finishes color boards in similar format as the interior finishes color boards, for presentation to the reviewers during an interim design conference. Provide original color samples of all exterior finishes including but not limited to the following:

- All Roof Finishes
- All Brick and Cast Stone Samples
- All Exterior Insulation and Finish Samples
- All Glass Color Samples
- All Exterior Metals Finishes
- All Window & Door Frame Finishes
- All Specialty Item Finishes, including trim

Identify each item on the exterior finishes color boards and key to the building elevations to provide a clear indication of how and where each item will be used.

### 2.2. STRUCTURAL INTERIOR DESIGN DOCUMENTS

#### 2.2.1. General

Structural interior design related drawings must indicate the placement of extents of SID material, finishes and colors and must be sufficiently detailed to define all interior work. The following is a list of minimum requirements:

#### 2.2.2. Finish Color Schedule

Provide finish color schedule(s) in the contract documents. Provide a finish code, material type, manufacturer, series, and color designations. Key the finish code to the color board samples and drawings.

#### 2.2.3. Interior Finish Plans

Indicate wall and floor patterns and color placement, material transitions and extents of interior finishes.

#### 2.2.4. Furniture Footprint Plans

Provide furniture footprint plans showing the outline of all freestanding and systems furniture for coordination of all other disciplines.

#### 2.2.5. Interior Signage

Include interior signage plans or schedules showing location and quantities of all interior signage. Key each interior sign to a quantitative list indicating size, quantity of each type and signage text.

#### 2.2.6. Interior Elevations, Sections and Details

Indicate material, color and finish placement.

## **ATTACHMENT B FURNITURE, FIXTURES & EQUIPMENT (FF&E) REQUIREMENTS**

### **1.0 FF&E REQUIREMENTS FOR THE INTERIM AND FINAL DESIGN SUBMITTALS**

#### **1.1. FORMAT AND SCHEDULE**

Prepare and submit for approval a comprehensive FF&E scheme for an interim design submittal. The Contractor's interior designer, not a furniture dealer, shall develop the design. FF&E is the selection, layout, specification and documentation of furniture includes but is not limited to workstations, seating, tables, storage and shelving, filing, trash receptacles, clocks, framed artwork, artificial plants, and other accessories. Contract documentation is required to facilitate pricing, procurement and installation. The FF&E package is based on the furniture footprint developed in the Structural Interior Design (SID) portion of the interior design. Develop the FF&E package concurrently with the building design to ensure that there is coordination between the electrical outlets, switches, J-boxes, communication outlets and connections, and lighting as appropriate. In addition, coordinate layout with other building features such as architectural elements, thermostats, location of TV's, GF/GI equipment (for example computers, printers, copiers, shredders, faxes), etc. Locate furniture in front of windows only if the top of the item falls below the window and unless otherwise noted, do not attach furniture including furniture systems to the building. If project has SIPRNET and/or NIPRNET, coordinate furniture layout with SIPRNET and NIPRNET separation requirements. Verify that access required by DOIM for SIPRNET box and conduit is provided. The DOR shall interview appropriate Government personnel to determine FF&E requirements for furniture and furnishings prior to preparation of the scheme to be presented. Determine FFE items and quantities by, but not limited to: (1) the number of personnel to occupy the building, (2) job functions and related furniture/office equipment to support the job function, (3) room functions, (4) rank and grade. Present original sets of the scheme to reviewers at an interim design conference upon completion of the interim architectural submittal or three months prior to the submittal of the final FF&E package (whichever comes first).

Design may proceed to final with the FF&E scheme presented at the conclusion of the interim phase, after resolutions to the comments have been agreed upon between DOR and Government reviewers.

Provide six copies of the electronic versions of all documents upon completion of the final architectural submittal or ten months prior to the contract completion date (whichever comes first), to ensure adequate time for furniture acquisition. Provide unbound, electronic drawings in CAD and BIM. Provide all files needed to view complete drawings. Submit all text documents in Microsoft Word or Excel..

Submit four copies of the final and complete FF&E information and samples in 8 1/2" x 11" format using three ring binders with pockets on the inside of the cover upon completion of the final architectural submittal or ten months prior to the contract completion date (whichever comes first). Use more than one binder when there are numerous pages with thick samples. Large D-ring binders are preferred to O-ring binders. Use page protectors that are strong enough to keep pages from tearing out for upholstery and finish boards. Anchor large or heavy samples with mechanical fasteners, Velcro, or double-faced foam tape rather than rubber cement or glue. Fold out items must have a maximum spread of 25 1/2". Provide cover and spine inserts sheets identifying the document as "Furniture, Fixtures & Equipment" package and include the project title and location, project number, Contractor/A/E name and phone number(s), submittal stage and date.

Provide electronic copies of all documents upon completion of the final architectural submittal or ten months prior to the contract completion date (whichever comes first), to ensure adequate time for furniture acquisition. Provide six compact disks with all drawings files needed to view the complete drawings unbound and in the latest version AutoCAD. Provide six additional compact disks of all text documents in Microsoft Word or Excel.

Design submittal requirements include, but are not limited to:

##### **1.1.1. Narrative of Interior Design Objectives**

Provide a narrative description of the furniture, to include functional, safety and ergonomic considerations, durability, sustainability, aesthetics, and compatibility with the building design.

##### **1.1.2. Furniture Order Form**



Prepare one Furnishings Order Form for each item specified in the design. This form identifies all information required to order each individual item. In addition to the project name and location, project number, and submittal phase, the order form must include:

- (a) Furniture item illustration and code
- (b) Furniture item name
- (c) Job name, location, and date
- (d) General Services Administration (GSA) FSC Group, part, and section
- (e) Manufacturer, Product name and Product model number or National Stock Number (NSN)
- (f) Finish name and number (code to finish samples)
- (g) Fabric name and number, minimum Wyzenbeek Abrasion Test double rubs (code to fabric samples)
- (h) Dimensions
- (i) Item location by room number and room name
- (j) Quantity per room
- (k) Total quantity
- (l) Special instructions for procurement ordering and/or installation (if applicable)
- (m) Written Product Description: include a non-proprietary paragraph listing the salient features of the item to include but not limited to:
  - (1) required features and characteristics
  - (2) ergonomic requirements
  - (3) functional requirements
  - (4) testing requirements
  - (5) furniture style
  - (6) construction materials
  - (7) minimum warranty

The following is an example for “m” features and characteristics, ergonomic requirements and functional requirements:

Chair Description:

- (1) Mid-Back Ergonomic Task Chair
- (2) Pneumatic Gaslift; Five Star Base
- (3) Mesh Back; Upholstered Seat
- (4) Height and Width Adjustable Task Arms:
  - a. Arm Height: 6”- 11” (+-1/2”)
  - b. Arm Width: 2”– 4” adjustment
- (5) Height Adjustable Lumbar Support
- (6) Adjustable Seat Height 16”-21” (+- 1”)
- (7) Sliding Seat Depth Adjustment 15”-18” (+-1”)
- (8) Standard Hard Casters (for carpeted areas)
- (9) Overall Measurements:
  - a. Overall width: 25” - 27”
  - b. Overall depth: 25”– 28”

(10) Must have a minimum of the following adjustments (In addition to the above):

- a. 360 Degree Swivel
- b. Knee-Tilt with Tilt Tension
- c. Back angle
- d. Forward Tilt
- e. Forward Tilt and Upright Tilt Lock

For projects with systems furniture, also provide a written description of the following minimum requirements:

- (1) Type furniture systems (panel, stacking panels, spine wall, desk based system, or a combination)
- (2) Minimum noise reduction coefficient (NRC)
- (3) Minimum sound transfer coefficient (STC)
- (4) Minimum flame spread and smoke development
- (5) UL testing for task lighting and electrical system
- (6) Panel widths and heights and their locations (this may be done on the drawings) Worksurface types and sizes (this may be done on the drawings)
- (7) Worksurface edge type
- (8) Varying panel/cover finish materials and locations (locations may be shown on the drawings)
- (9) Storage requirements
- (10) Keyboard requirements
- (11) Lock and keying requirements
- (12) Accessory components (examples: tack boards, marker boards, paper management)
- (13) Electrical and communication raceway requirement; type, capacity and location (base, beltline, below and/or above beltline)
- (14) Locations of communication cables (base, beltline, below and/or above beltline, top channel)
- (15) Types of electrical outlets
- (16) Types of communication jacks; provided and installed by others
- (17) Locations of electrical outlets and communication jacks (this may be done on the drawings)
- (18) Type of cable (examples: Cat. 5, Cat. 6, fiber optic; UTP or STP, etc.) system needs to support; provided and installed by others

#### 1.1.3. Alternate Manufacturer List

Provide a table consisting of major furniture items that lists the manufacturers products specified on the Order Form and two alternate manufacturers. Major furniture items include, but are not limited to, casegoods, furniture systems, seating, and tables. Organize matrix by item code and item name. Supply alternates that are available on GSA Schedule and meet the requirements of the Furniture Order Form. One of the two alternates must be from UNICOR if possible. Provide manufacturer name address, telephone number, product series and product name for each alternate manufacturer.

#### 1.1.4. FF&E Procurement List

Provide a table that lists all FF&E furniture, mission unique equipment and building Contractor Furnished/Contractor Installed (CF/CI) items. Give each item a code and name and designate whether item will be procured as part of the FF&E furniture, mission unique equipment or the building construction contract. Use the item code to key all FF&E documents including location plans, color boards, data sheets, cost estimate, etc.

#### 1.1.5. Points of Contact (POCs)

Provide a comprehensive list of POCs needed to implement the FF&E package. This would include but not be limited to appropriate project team members, using activity contacts, interior design representatives, construction contractors and installers involved in the project. In addition to name, address, phone, fax and email, include each contact's job function. Divide the FF&E package into different sections based on this listing, applies to order forms and cost estimates.

#### 1.1.6. Color Boards

Provide color boards for all finishes and fabrics for all FF&E items. Finishes to be included but not limited to paint, laminate, wood finish, fabric, etc.

#### 1.1.7. Itemized Furniture Cost Estimate

Provide an itemized cost estimate of furnishings keyed to the plans and specifications of products included in the package. This cost estimate should be based on GSA price schedules. The cost estimate must include separate line items for general contingency, installation, electrical hook-up for systems furniture or other furniture requiring hardwiring by a licensed electrician, freight charges and any other related costs. Installation and freight quotes from vendors should be use in lieu of a percentage allowance when available. Include a written statement that the pricing is based on GSA schedules. An estimate developed by a furniture dealership may be provided as support information for the estimate, but must be separate from the contractor provided estimate.

### 1.2. INTERIOR DESIGN DOCUMENTS

#### 1.2.1. Overall Furniture and Area Plans

Provide floor Plans showing locations and quantities of all freestanding, and workstation furniture proposed for each floor of the building. Key each room to a large scale Furniture Placement Plan showing the furniture configuration, of all furniture. Provide enlarged area plans with a key plan identifying the area in which the building is located. Key all the items on the drawings by furniture item code. Do not provide manufacturer specific information such as product names and numbers on drawings, Drawings shall be non-proprietary. This is typical for FFE on all plans, including those mentioned below.

#### 1.2.2. Workstation Plans

Show each typical workstation configuration in plan view, elevations or isometric view. Drawings shall illustrate panels and all major components for each typical workstation configuration. Identify workstations using the same numbering system as shown on the project drawings. Key components to a legend on each sheet which identifies and describes the components along with dimensions. Provide the plan, elevations and isometric of each typical workstation together on the same drawing sheet.

#### 1.2.3. Panel Plans

Show panel locations and critical dimensions from finished face of walls, columns, panels including clearances and aisle widths. Key panel assemblies to a legend which shall include width, height, configuration of frames, panel fabric and finishes (if there are different selections existing within a project), powered or non-powered panel and wall mount locations.

#### 1.2.4. Desk Plans

Provide typical free standing desk configurations in plan view, elevation or isometric view and identify components to clearly represent each desk configuration.

#### 1.2.5. Reflected Ceiling Plans

Provide typical plans showing ceiling finishes and heights, lighting fixtures, heating ventilation and air conditioning supply and return, and sprinkler head placement for coordination of furniture.

#### 1.2.6. Electrical and Telecommunication Plans

Show power provisions including type and locations of feeder components, activated outlets and other electrical components. Show locations and quantities of outlets for workstations. Clearly identify different outlets, i.e. electrical, LAN and telecommunication receptacles indicating each type proposed. Show wiring configuration, (circuiting, switching, internal and external connections) and provide as applicable.

#### 1.2.7. Artwork Placement Plans

Provide an Artwork Placement Plan to show location of artwork, assign an artwork item code to each piece of artwork. As an alternative, artwork can be located on the Furniture Plans. Provide a schedule that identifies each piece by room name and number. Provide installation instructions; include mounting height.

#### 1.2.8. Window Drapery Plans

Provide Interior Window Drapery Plans. Key each drapery treatment to a schedule showing color, pattern, material, drapery size and type, draw direction, location and quantities.

### 1.3. FURNITURE SELECTION

1.3.1. Select furniture from the GSA Schedules. Specify furniture available open market when an item is not available on the GSA Schedules. Provide justification for items not available on the GSA Schedules.

1.3.2. To the greatest extent possible when specifying furniture work within a manufacturer's family of furniture for selections, example: Steelcase, Turnstone, Brayton International, Metro, and Vecta are all Steelcase companies. Each alternate should also be specified from a manufacturer's family of furniture, example: first set of alternates would be specified from Knoll's family of furniture and the second from Herman Miller family of furniture. It may be necessary to make some selections from other than a manufacturer's family of furniture if costs are not reasonable for particular items, some items are not available or appropriate for the facility or the items are not on GSA Schedule. If this occurs, consider specifying product from an open line that is accessible by numerous dealerships. Select office furniture including case goods, tables, storage, seating, etc. that is compatible in style, finish and color. Select furniture that complies with ANSI/BIFMA and from manufacturer's standard product line as shown in the most recent published price list and/or amendment and not custom product.

### 1.4. CONSTRUCTION

1.4.1. Provide knee space at workstations and tables that is not obstructed by panels/legs that interfere with knee space of seated person and specify modesty panels at walls to be of a height or be hinged to allow access to building wall electrical outlets and communication jacks. Provide desks, storage and tables with leveling devices to compensate for uneven floors.

1.4.2. Specify workstations and storage of steel construction. Provide worksurface tops constructed to prevent warpage. Provide user friendly features such as radius edges. Do not use sharp edges and exposed connections and ensure the underside of desks, tables and worksurfaces are completely and smoothly finished. Provide abutting worksurfaces that mate closely and are of equal heights when used in side-by-side configurations in order to provide a continuous and level worksurface.

1.4.3. Drawers shall stay securely closed when in the closed position and protect wires from damage during drawer operation. Include a safety catch to prevent accidental removal when fully open

1.4.4. Unless otherwise noted, provide lockable desks and workstations, filing cabinets and storage. Key all locks within a one person office the same; key all one person offices within a building differently. If an office or open office area has more than one workstation, key all the workstations differently, but key all locks within an individual workstation the same. Use tempered glass glazing when glazing is required. Use light-emitting diode (LED)/solid state lighting where task lighting is required in furniture.

### 1.5. FINISHES AND UPHOLSTERY

1.5.1. Specify neutral colors for casegoods, furniture systems, storage and tables. Specify desk worksurfaces and table tops that are not too light or too dark in color and have a pattern to help hide soiling. Accent colors are

allowed in break and lounge areas. Keep placement of furniture systems panel fabric accent colors to a minimum. All finishes shall be cleanable with ordinary household cleaning solutions.

1.5.2. Use manufacturer's standard fabrics; including textile manufacturers fabrics that have been graded into the furniture manufactures fabric grades and are available through their GSA Schedule. Customers Own Material (COM) can be used in headquarter buildings in command suites with executive furniture. Coordinate specific locations with Corps of Engineers Interior Designer.

1.5.3. Specify seating upholstery that meets Wyzenbeek Abrasion Test, 55,000 minimum rubs. Specify a soil retardant finish for woven fabrics if Crypton or vinyl upholstery is not provided for seating in dining areas. Use manufacturer's standard fabrics. This includes textile manufacturers fabrics that have been graded into the furniture manufactures fabric grades and are available through their GSA Schedule. Specify upholstery and finish colors and patterns that help hide soiling. Specify finishes that can be cleaned with ordinary household cleaning solutions.

## 1.6. ACCESSORIES

1.6.1. Specify all accessories required for completely finished furniture installation. Provide filing cabinets and storage for office supplies. Provide tack surfaces at workstations with overhead storage. Provide tackable surfaces at workstations with overhead storage.

1.6.2. Not Used.

1.6.3. Workstations are to be equipped with stable keyboard trays that have height adjustability, tilting capability, including negative tilt, have a mouse pad at same height as the keyboard tray that can accommodate both left and right handed users, and retractable under worksurface.

## 1.7. MISSION UNIQUE EQUIPMENT

Funding for FF&E furniture items and mission unique equipment (MUE) items are from two different sources. Separate the designs and procurement documentation for FFE items and MUE. MUE includes, but is not limited to, items such as industrial shelving, workbenches, appliances, fitness equipment, IT equipment and supporting carts. The User will purchase and install mission unique equipment items, unless otherwise noted. Identify locations of known MUE items such as industrial shelving, workbenches, appliances, etc. for space planning purposes.

## 1.8. SUSTAINABILITY

1.8.1. For all designs provided regardless of facility type, make every effort to implement all aspects of sustainability to the greatest extent possible for all the selections made in the FF&E package. This includes but is not limited to the selection of products that consider: **Material Chemistry and Safety of Inputs** (What chemicals are used in the construction of the selections?); **Recyclability** (Do the selections contain recycled content?); **Disassembly** (Can the selections be disassembled at the end of their useful life to recycle their materials?).

1.8.2. Make selections to the greatest extent possible of products that possess current McDonough Braungart Design Chemistry ([MBDC](#)) certification or other "third-party" certified Cradle to Cradle program, Forest Stewardship Council (FSC) certification, GREENGAURD certification or similar "third-party" certified products consisting of low-emitting materials.

## 1.9. FURNITURE SYSTEMS

1.9.1. General.

Where appropriate, design furniture systems in open office areas. Coordinate style and color of furniture systems with other storage, seating, etc. in open office areas. Minimize the number of workstation typicals and the parts and pieces required for the design to assist in future reconfiguration and inventorying.

1.9.2. Connector Systems.

Specify a connector system that allows removal of a single panel or spine wall within a typical workstation configuration without requiring disassembly of the workstation or removal of adjacent panels. Specify connector

system with tight connections and continuous visual seals. When Acoustical panels are used, provide connector system with continuous acoustical seals. Specify concealed clips, screws, and other construction elements, where possible.

#### 1.9.3. Panels and Spine Walls

Specify panels and spine walls with hinged or removable covers that permit easy access to the raceway when required but are securely mounted and cannot be accidentally dislodged under normal conditions. Panels shall be capable of structurally supporting more than 1 fully loaded component per panel per side. Raceways are to be an integral part of the panel and must be able to support lay-in cabling and have a large capacity for electrical and IT. Do not thread cables through the frame.

#### 1.9.4. Electrical And Information/Technology (IT)

Design furniture with electrical systems that meets requirements of UL 1286 when powered panels are required and UL approved task lights that meet requirements of NFPA 70. Dependent on user requirements and Section 01 10 00, paragraph 3 requirements, it is recommended that workstation electrical and IT wiring entry come from the building walls to eliminate the use of power poles and access at the floor. Design electrical and IT systems that are easily accessed in the spine wall and panels without having to move return panels and components. Electrical and IT management will be easily accessible by removable wall covers which can be removed while workstation components are still attached. Specify connector system that has continuation of electrical and IT wiring within workstations and workstation to workstation.

#### 1.9.5. Pedestals

Specify pedestals that are interchangeable from left to right, and right to left, and retain pedestal locking system capability.

### 1.10. EXECUTIVE FURNITURE

1.10.1. Design for executive furniture in command areas, coordinate specific locations with Corps of Engineers Interior Designer. Use upgraded furniture, upholsteries and finishes in command suites. This includes but is not limited to wood casegoods, seating and tables. Select executive furniture casegoods from a single manufacturer and style line, to include workstations, credenzas, filing, and storage, etc.

1.10.2. Specify furniture with wood veneer finish (except worksurfaces) with mitered solid wood edge of same wood type. Provide worksurface plastic laminate that closely matches adjacent wood veneer. Other executive office furniture such as seating, tables, executive conference room furniture, etc. shall be compatible in style, finish and color with executive furniture casegoods.

### 1.11. SEATING

#### 1.11.1. General

Specify appropriate chair casters and glides for the floor finish where the seating is located. Universal casters that are appropriate for both hard surface flooring and carpet are preferred. All seating shall support up to a minimum of 250 lbs.

#### 1.11.2. Desk and Guest Seating

Select ergonomic desk chairs with casters, non-upholstered adjustable arms, waterfall front, swivel, tilt, variable back lock, adjustable back height or adjustable lumbar support, pneumatic seat height adjustment, and padded, contoured upholstered seat and back. Desk and guest chair backs may be other than upholstered such as mesh fabric if it is ergonomically designed, forms to back and is comfortable. Depending on scale of desk chair provide seat pan forward and back adjustment to increase or decrease depth of seat pan. All desk chairs shall have an adjustable seat height range of 4 1/2", range to include 16 1/2"-20". Select guest chairs that are compatible in style, finish and color with the desk chairs.

#### 1.11.3. Conference Room Seating

At tables, select ergonomic conference seating with casters, non-upholstered arms, waterfall front, swivel, tilt, pneumatic seat height adjustment, and padded, contoured seat and back, unless otherwise noted. Select arm height and/or design that allows seating to be moved up closely to the table top. Conference chair backs may be other than upholstered such as mesh fabric if it is ergonomically designed, forms to back and is comfortable. Perimeter conference chairs shall be compatible in style, finish and color with conference seating at the tables.

#### 1.11.4. Lounge, Waiting and Reception Area Seating

Select seating with arms and cushioned, upholstered seat and back. In heavy use areas, arms shall be easily cleaned such as non-upholstered arms or upholstered arms with wood arm caps unless otherwise noted.

#### 1.11.5. Break Room Seating

Select stackable seating that is easily cleaned. Seating shall be appropriate for table and counter heights as applicable with non-upholstered arms if arms are required. Chairs shall have metal legs and composite materials for seats.

#### 1.11.6. Lounge, Waiting and Reception Furniture.

Design for end and coffee tables with plastic laminate tops that are compatible in style finish and color with the seating.

#### 1.12. FILING AND STORAGE.

Select storage and shelving units that meet customer's functional load requirements for stored items. Specify counterweights for filing cabinets when required by the manufacturer for stability. File drawers shall allow only one drawer to be opened at a time. Provide heavy duty storage and shelving if information is not available.

#### 1.13. TRAINING TABLES.

Don't use plastic laminate self edge. Training tables shall be reconfigurable, moveable and storable; lighter weight folding with dollies or casters as necessary. Specify dollies if required.

#### 1.14. FURNITURE WARRANTIES.

Specify manufacturer's performance guarantees or warranties that include parts, labor and transportation as follows:

Furniture System, unless otherwise noted – 10 year minimum  
 Furniture System Task Lights – 2 year minimum, excluding bulbs  
 Furniture System Fabric – 3 year minimum  
 Desks - 10 year minimum  
 Seating, unless otherwise noted - 10 year minimum  
 Seating Mechanisms and Pneumatic Cylinders - 10 years  
 Fabric - 3 years minimum  
 Filing and Storage - 10 year minimum  
 Tables, unless otherwise noted - 10 year minimum  
 Table Mechanisms – 5 year  
 Table Ganging Device - 1 year  
 Items not listed above - 1 year minimum

## **ATTACHMENT C**

### **TRACKING COMMENTS IN DRCHECKS**

#### **1.0 General**

The Government and DB Contractor shall set up the project in Dr Checks. Throughout the design process, the parties shall enter, track, and back-check comments using the DrChecks system. Government reviewers enter design review comments into DrChecks. Designers of Record shall annotate comments timely and specifically to indicate exactly what action will be taken or why the action is not required. Comments considered critical by the conference participants shall be flagged as such.

#### **2.0 DrChecks Review Comments**

The Contractor and the Government shall monitor DrChecks to assure all comments are annotated and agreed to by the designers and reviewers prior to the next submittal. The DrChecks comments and responses shall be printed and included in the design analysis for record.

2.1. Conference participants (reviewers) will expect coordination between Design Analysis calculations and the submitted design. Reviewers will also focus on the design submittal's satisfaction of the contract requirements.

2.2. The Designers of Record shall answer each comment in DrChecks with a formal response prior to the next submittal, clearly indicating what action will be taken and what drawing/spec will change. Designers of Record are encouraged to directly contact reviewers to discuss and agree to the formal comment responses rather than relying only on DrChecks and review meetings to discuss comments. With the next design conference, reviewers will back-check answers to the comments against the submittal, in addition to reviewing additional design work.

2.3. Comments that, in the DB Contractor's opinion, require effort outside the scope of the contract shall be clearly indicated as such in DrChecks. The DB Contractor shall not proceed with work outside the contract until a modification to the contract is properly executed, if one is necessary.

#### **3.0 DrChecks Initial Account Set-Up**

To initialize an office's use of DrChecks, choose a contact person within the office to call the DrChecks Help Desk at 800-428-HELP, M-F, 8AM-5PM, Central time. This POC will be given an office password to distribute to others in the office. Individuals can then go to the hyperlink at <http://www.projnet.org> and register as a first time user. Upon registration, each user will be given a personal password to the DrChecks system.

3.1. Once the office and individuals are registered, the COE's project manager or lead reviewer will assign the individuals and/or offices to the specific project for review. At this point, persons assigned can make comments, annotate comments, and close comments, depending on their particular assignment.

#### **4.0 DrChecks Reviewer Role**

The Contractor is the technical reviewer and the Government is the compliance reviewer of the DB designers design documents. Each reviewer enters their own comments into the Dr Checks system. To enter comments:

4.1. Log into DrChecks.

4.2. Click on the appropriate project.

4.3. Click on the appropriate review conference. An Add comment screen will appear.

4.4. Select or fill out the appropriate sections (particularly comment discipline and type of document for sorting) of the comment form and enter the comment in the space provided.

4.5. Click the Add Comment button. The comment will be added to the database and a fresh screen will appear for the next comment you have.



4.6. Once comments are all entered, exit DrChecks by choosing “My Account” and then Logout.

## **5.0 DrChecks Comment Evaluation**

The role of the designers of record is to evaluate and respond to the comments entered by the Government reviewers and by the DB Contractor. To respond to comments:

5.1. Log into DrChecks.

5.2. Click on the appropriate project.

5.3. Under “Evaluate” click on the number under “Pending”.

5.4. Locate the comments that require your evaluation. (Note: If you know the comment number you can use the Quick Pick window on your home page in DrChecks; enter the number and click on go.)

5.5. Select the appropriate evaluation (concur, non-concur, for information only, or check and resolve) and add the response.

5.6. Click on the Add button. The evaluation will be added to the database and a fresh screen will appear with the next comment.

5.7. Once evaluations are all entered, exit DrChecks by choosing “My Account” and then Logout.

## **6.0 DrChecks Back-check**

At the following design conference, participants will back-check comment annotations against newly presented documents to verify that the designers' responses are acceptable and completed. The Contractor and Government reviewers shall either enter additional back-check comments, as necessary or close those that are resolved as a result of the design conferences:

6.1. Log into DrChecks.

6.2. Click on the appropriate project.

6.3. Under “My Backcheck” click on the number under “Pending”.

6.4. If you agree with the designer's response select “Close Comment” and add a closing response if desired.

6.5. If you do not agree with the designer's response or the submittal does not reflect the response given, select “Issue Open”, enter additional information.

6.6. Click on the Add button. The back-check will be added to the database and a fresh screen will appear with the next comment.

6.7. Once back-checks are all entered, exit DrChecks by choosing “My Account” and then Logout. The design is completed and final when there are no pending comments to be evaluated and there are no pending or open comments under back-check.

**ATTACHMENT D**  
**SAMPLE FIRE PROTECTION AND LIFE SAFETY CODE REVIEW**

Instructions: Use the information outlined in this document to provide the minimum requirement for development of Fire Protection and Life Safety Code submittals for all building projects. Additional and supplemental information may be used to further develop the code review. Insert N/A after criteria, which may be "not applicable".

**1.0 SAMPLE FIRE PROTECTION AND LIFE SAFETY CODE REVIEW**

- 1.1. Project Name (insert name and location)
- 1.2. Applicable Codes and Standards
  - 1.2.1. Unified Facilities Criteria (UFC): 3-600-01, Design: Fire Protection Engineering For Facilities
  - 1.2.2. International Building Code (IBC) for fire resistance requirements, allowable floor area, building height limitations and building separation distance requirements, except as modified by UFC 3-600-01.
  - 1.2.3. National Fire Protection Association (NFPA) 101 Life Safety Code (latest edition), for building egress and life safety and applicable criteria in UFC 3-600-01.
  - 1.2.4. ADA and ABA Accessibility Guidelines. For Buildings and Facilities See Section 01 10 00, Paragraph 3 for facility specific criteria.
- 1.3. Occupancy Classification  
IBC chapters 3 and 4
- 1.4. Construction Type  
IBC chapter 6
- 1.5. Area Limitations  
IBC chapter 5, table 503
- 1.6. Allowable Floor Areas  
IBC section 503, 505
- 1.7. Allowable area increases  
IBC section 506, 507
- 1.8. Maximum Height of Buildings  
IBC section 504
- 1.9. Fire-resistive substitution
- 1.10. Occupancy Separations  
IBC table 302.3.2
- 1.11. Fire Resistive Requirements
  - 1.11.1. Exterior Walls - [ ] hour rating, IBC table 601, 602
  - 1.11.2. Interior Bearing walls - [ ] hour rating
  - 1.11.3. Structural frame - [ ] hour rating
  - 1.11.4. Permanent partitions - [ ] hour rating

- 1.11.5. Shaft enclosures - [ ] hour rating
- 1.11.6. Floors & Floor-Ceilings - [ ] hour rating
- 1.11.7. Roofs and Roof Ceilings - [ ] hour rating
- 1.12. Automatic Sprinklers and others used to determine the need for automatic Extinguishing Equipment, Extinguishing Systems, Foam Systems, Standpipe
  - 1.12.1. UFC 3-600-01, chapters 4 and 6 systems, wet chemical systems, etc. State which systems are required and to what criteria they will be designed.
  - 1.12.2. UFC 3-600-01, Appendix B Occupancy Classification. Note the classification for each room. This may be accomplished by classifying the entire building and noting exceptions for rooms that differ (E.g. The entire building is Light Hazard except boiler room and storage rooms which are [ ], etc.)
  - 1.12.3. UFC 3-600-01, Chapter 3 Sprinkler Design Density, Sprinkler Design Area, Water Demand for Hose Streams (supply pressure and source requirements).
  - 1.12.4. UFC 3-600-01, Chapter 4 Coverage per sprinkler head. Extended coverage sprinkler heads are not permitted.
  - 1.12.5. Available Water Supply. Provide the results of the water flow tests showing the available water supply static pressure and residual pressure at flow. Based on this data and the estimated flow and pressure required for the sprinkler system, determine the need for a fire pump.
  - 1.12.6. NFPA 13, Para. 8.16.4.6.1. Provide backflow preventer valves as required by the local municipality, authority, or water purveyor. Provide a test valve located downstream of the backflow preventer for flow testing the backflow preventer at full system demand flow. Route the discharge to an appropriate location outside the building.
- 1.13. Kitchen Cooking Exhaust Equipment

Describe when kitchen cooking exhaust equipment is provided for the project. Type of extinguishing systems for the equipment should be provided. per NFPA 96. Show all interlocks with manual release switches, fuel shutoff valves, electrical shunt trips, exhaust fans, and building alarms.
- 1.14. Portable Fire Extinguishers, fire classification and travel distance. per NFPA 10
- 1.15. Enclosure Protection and Penetration Requirements. - Opening Protectives and Through Penetrations
  - 1.15.1. IBC Section 712, 715 and Table 715.3. Mechanical rooms, exit stairways, storage rooms, janitor [ ] hour rating. IBC Table 302.1.1
  - 1.15.2. Fire Blocks, Draft Stops, Through Penetrations and Opening Protectives
- 1.16. Fire Dampers. Describe where fire dampers and smoke dampers are to be used (IBC Section 716 and NFPA 90A). State whether isolation smoke dampers are required at the air handler.
- 1.17. Detection Alarm and Communication. UFC 3-600-01, (Chapter 5); NFPA 101 para. 3.4 (chapters 12-42); NFPA 72
- 1.18. Mass Notification. Describe building/facility mass notification system (UFC 4-021-01) type and type of base-wide mass notification/communication system. State whether the visible notification appliances will be combined with the fire alarm system or kept separate. (Note: Navy has taken position to combine visible notification appliances with fire alarm).
- 1.19. Interior Finishes (classification). NFPA 101.10.2.3 and NFPA 101.7.1.4
- 1.20. Means of Egress

- 1.20.1. Separation of Means of Egress, NFPA 101 chapters 7 and 12-42; NFPA101.7.1.3
- 1.20.2. Occupant Load, NFPA101.7.3.1 and chapters 12-42.
- 1.20.3. Egress Capacity (stairs, corridors, ramps and doors) NFPA101.7.3.3
- 1.20.4. Number of Means of Egress, NFPA101.7.4 and chapters 12-42.
- 1.20.5. Dead end limits and Common Path of Travel, NFPA 101.7.5.1.6 and chapters 12-42.
- 1.20.6. Accessible Means of Egress (for accessible buildings), NFPA101.7.5.4
- 1.20.7. Measurement of Travel Distance to Exits, NFPA101.7.6 and chapters 12-42.
- 1.20.8. Discharge from Exits, NFPA101.7.7.2
- 1.20.9. Illumination of Means of Egress, NFPA101.7.8
- 1.20.10. Emergency Lighting, NFPA101.7.9
- 1.20.11. Marking of Means of Egress, NFPA101.7.10
- 1.21. Elevators, UFC 3-600-01, Chapter 6; IBC and ASME A17.1 - 2000,(Safety Code for Elevators and Escalators)
- 1.22. Accessibility Requirements, ADA and ABA Accessibility Guidelines for Buildings and Facilities
- 1.23. Certification of Fire Protection and Life Safety Code Requirements. (Note: Edit the Fire team membership if necessary). Preparers of this document certify the accuracy and completeness of the Fire Protection and Life Safety features for this project in accordance with the attached completed form(s).
- 1.24. Designer of Record. Certification of Fire protection and Life Safety Code Requirements. (Note: Edit the Fire team members if necessary). Preparers of this document certify the accuracy and completeness of the Fire Protection and Life Safety features of this project.

Fire Protection Engineer of Record:

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Signature and Stamp

Date

OR

Architect of Record:

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Signature and Stamp

Date

Mechanical Engineer of Record:

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Signature and Stamp

Date

Electrical Engineer of Record:

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Signature/Date

**ATTACHMENT E**  
**LEED SUBMITTALS**

LEED Credit Paragraph	Contractor Check Here if Credit is Claimed	LEED-NC v2.2 Submittals (OCT09REV)	Provide for Credit Audit Only	REQUIRED DOCUMENTATION	Date Submitted (to be filled in by Contractor)	Government Reviewer's Use (OCT09REV)
PAR	FEATURE	DUE AT			DATE	REV
<b>GENERAL</b>						
	GENERAL - All calculations shall be in accordance with LEED 2.2 Reference Guide.					
	GENERAL: Obtain excel version of this spreadsheet at <a href="http://en.sas.usace.army.mil/enWeb/EngineeringCriteria">http://en.sas.usace.army.mil/enWeb/EngineeringCriteria</a> . OCT09REV					
	GENERAL - For all credits, narrative/comments may be added to describe special circumstances or considerations regarding the project's credit approach.					
	GENERAL - Include all required LEED drawings indicated below in contract drawings with applicable discipline drawings, labeled For Reference Only.					
	NOTE: Each submittal indicated with "****" differs from LEED certified project submittals by either having a different due date or being an added submittal not required by GBCI. OCT09REV					
	OCT09REV GENERAL - Audit documentation may include but is not limited to what is indicated in this table.					
			Closeout	List of all Final Design submittals revised after final design to reflect actual closeout conditions. Revised Final Design submittals. - OR - Statement confirming that no changes have been made since final design that effect final design submittal documents.		Proj Engr (PE)
<b>CATEGORY 1 - SUSTAINABLE SITES</b>						
SSPR1	Construction Activity Pollution Prevention (PREREQUISITE)	**Final Design		List of drawings and specifications that address the erosion control, particulate/dust control and sedimentation control measures to be implemented.		CIV
OCT09REV		**Final Design		Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
		**Final Design		Narrative that indicates which compliance path was used (NPDES or Local standards) and describes the measures to be implemented on the project. If a local standard was followed, provide specific information to demonstrate that the local standard is equal to or more stringent than the NPDES program.		CIV
SS1	Site Selection	Final Design		Statement confirming that project does not meet any of the prohibited criteria.		CIV
OCT09REV		**Final Design		Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
		Final Design	X	LEED Site plan drawing that shows all proposed development, line depicting boundary of all bodies of water and/or wetlands within 100 feet of project boundary and a line depicting 5' elevation above 100 year flood line that falls within project boundary. Not required if neither condition applies.		CIV
SS2	Development Density & Community Connectivity	Final Design		Option 1: LEED Site vicinity plan showing project site and surrounding development. Show density boundary or note drawing scale.		CIV
OCT09REV		**Final Design		Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
		Final Design		Option 1: Table indicating, for project site and all surrounding sites within density radius (keyed to site vicinity plan), site area and building area. Project development density calculation. Density radius calculation. Development density calculation within density radius.		CIV
		Final Design		Option 2: LEED Site vicinity plan showing project site, the 1/2 mile community radius, pedestrian walkways and the locations of the residential development(s) and Basic Services surrounding the project site.		CIV
		Final Design		Option 2: List (including business name and type) of all Basic Services facilities within the 1/2 mile radius, keyed to site vicinity plan.		CIV
SS3	Brownfield Redevelopment	Final Design		Narrative describing contamination and the remediation activities included in project. Include statement indicating how site was determined to be a brownfield.		CIV
OCT09REV		**Final Design		Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
SS4.1	Alternative Transportation: Public Transportation Access	Final Design		Statement indicating which option for compliance applies. State whether public transportation is existing or proposed and, if proposed, cite source of this information.		CIV
OCT09REV		**Final Design		Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
		Final Design		Option 1: LEED Site vicinity plan showing project site, mass transit stops and pedestrian path to them with path distance noted.		CIV
		Final Design		Option 2: LEED Site vicinity plan showing project site, bus stops and pedestrian path to them with path distance noted.		CIV
SS4.2	Alternative Transportation: Bicycle Storage & Changing Rooms	Final Design		FTE calculation. Bicycle storage spaces calculation. Shower/changing facilities calculation.		CIV
		Final Design		List of drawings that show the location(s) of bicycle storage areas. Statement indicating distance from building entrance.		CIV
		Final Design		List of drawings that show the location(s) of shower/changing facilities and, if located outside the building, statement indicating distance from building entrance.		ARC
SS4.3	Alternative Transportation: Low Emitting & Fuel Efficient Vehicles	Final Design		Statement indicating which option for compliance applies. FTE calculation. Statement indicating total parking capacity of site.		CIV
OCT09REV		**Final Design		Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
		Final Design		Option 1: Low-emission & fuel-efficient vehicle calculation.		CIV

Monday, January 31, 2011

LEED Credit Paragraph	Contractor Check Here if Credit is Claimed	LEED-NC v2.2 Submittals (OCT09REV)	Provide for Credit Audit Only		Date Submitted (to be filled in by Contractor)	Government Reviewer's Use (OCT09REV)
PAR		FEATURE	DUE AT	REQUIRED DOCUMENTATION	DATE	REV
			Final Design	Option 1: List of drawings and specification references that show location and number of preferred parking spaces for low-emission & fuel-efficient vehicles and signage.		CIV
			Final Design	Option 1: Statement indicating quantity, make, model and manufacturer of low-emission & fuel-efficient vehicles to be provided. Statement confirming vehicles are zero-emission or indicating ACEEE vehicle scores.		CIV
			Final Design	Option 2: Low-emission & fuel-efficient vehicle parking calculation.		CIV
			Final Design	Option 2: List of drawings and specification references that show location and number of preferred parking spaces and signage.		CIV
			Final Design	Option 3: Low-emission & fuel-efficient vehicle refueling station calculation.		CIV
			Final Design	Option 3: List of drawings and specifications indicating location and number of refueling stations, fuel type and fueling capacity for each station for an 8-hour period.		CIV
			Closeout	Option 3: Construction product submittals indicating what was provided and confirming compliance with respect to fuel type and fueling capacity for each station for an 8-hour period.		CIV
SS4.4		Alternative Transportation: Parking Capacity	Final Design	Statement indicating which option for compliance applies.		CIV
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			Final Design	Option 1: Preferred parking calculation including number of spaces required, total provided, preferred spaces provided and percentage.		CIV
			Final Design	Option 2: FTE calculation. Preferred parking calculation including number of spaces provided, preferred spaces provided and percentage.		CIV
			Final Design	Options 1 and 2: List of drawings and specification references that show location and number of preferred parking spaces and signage.		CIV
			Final Design	Option 3: Narrative indicating number of spaces required and provided and describing infrastructure and support programs with description of project features to support them.		CIV
SS5.1		Site Development: Protect or Restore Habitat	**Final Design	Option 1: List of drawing and specification references that convey site disturbance limits.		CIV
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			**Final Design	Option 2: LEED site plan drawing that delineates boundaries of each preserved and restored habitat area with area (sf) noted for each.		CIV
			**Final Design	Option 2: Percentage calculation of restored/preserved habitat to total site area. List of drawings and specification references that convey restoration planting requirements.		CIV
SS5.2		Site Development: Maximize Open Space	Final Design	Option 2: LEED site plan drawing delineating boundary of vegetated open space adjacent to building with areas of building footprint and designated open space noted.		CIV
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
SS6.1		Stormwater Design: Quantity Control	Final Design	Statement indicating which option for compliance applies.		CIV
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			Final Design	Option 1: Indicate pre-development and post-development runoff rate(cfs) and runoff quantity (cf) -OR - Narrative describing site conditions, measures and controls to be implemented to prevent excessive stream velocities and erosion.		CIV
			Final Design	Option 2: Indicate pre-development and post-development runoff rate(cfs) and runoff quantity (cf). Indicate percent reduction in each.		CIV
SS6.2		Stormwater Design: Quality Control	Final Design	For non-structural controls, list all BMPs used and, for each, describe the function of the BMP and indicate the percent annual rainfall treated. List all structural controls and, for each, describe the pollutant removal and indicate the percent annual rainfall treated.		CIV
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
SS7.1		Heat Island Effect: Non-Roof	**Final Design	LEED site plan drawing indicating locations and quantities of each paving type, including areas of shaded pavement. Percentage calculation indicating percentage of reflective/shaded/open grid area.		CIV
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
SS7.2		Heat Island Effect: Roof	Final Design	Option 1: Percentage calculation indicating percentage of SRI compliant roof area. List of drawings and specification references that convey SRI requirements and roof slopes.		ARC

Monday, January 31, 2011



LEED Credit Paragraph	Contractor Check Here if Credit is Claimed	LEED-NC v2.2 Submittals (OCT09REV)	Provide for Credit Audit Only		Date Submitted (to be filled in by Contractor)	Government Reviewer's Use (OCT09REV)
PAR		FEATURE	DUE AT	REQUIRED DOCUMENTATION	DATE	REV
			Final Design OCT09REV	Option 1: List of specified roof materials indicating, for each, product type, manufacturer, product name and identification if known, SRI value and roof slope. OCT09REV		ARC
			**Closeout OCT09REV	Option 1: List of installed roof materials indicating, for each, manufacturer, product name and identification, SRI value and roof slope.		PE
			Closeout	X Option 1: Manufacturer published product data or certification confirming SRI		PE
			Final Design	Option 2: Percentage calculation indicating percentage of vegetated roof area.		ARC
			Final Design	Option 3: Combined reflective and green roof calculation.		ARC
			Final Design OCT09REV	Option 3: List of specified roof materials indicating, for each, product type, manufacturer, product name and identification if known, SRI value and roof slope. OCT09REV		
			**Closeout OCT09REV	Option 3: List of installed roof materials indicating, for each, manufacturer, product name and identification, SRI value and roof slope.		PE
			Closeout	X Option 3: Manufacturer published product data or certification confirming SRI		PE
SS8		Light Pollution Reduction	Final Design	Interior Lighting: List of drawings and specification references that convey interior lighting requirements (location and type of all installed interior lighting, location of non-opaque exterior envelope surfaces, allowing confirmation that maximum candela value from interior fixtures does not intersect non-opaque building envelope surfaces). - OR - List of drawings and specification references that show automatic lighting controls that turn off non-essential lighting during non-business hours		ELEC
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		ELEC
			Final Design	Exterior Lighting: List of drawings and specification references that convey exterior lighting requirements (location and type of all site lighting and building facade/landscape lighting).		ELEC
			Final Design	Exterior Site Lighting Power Density (LPD): Tabulation for exterior site lighting indicating, for each location identification or description, units of measure, area or distance of the location, actual LPD using units consistent with ASHRAE 90.1, and the ASHRAE allowable LPD for that type of location. Percentage calculation of actual versus allowable LPD for all site lighting.		ELEC
			Final Design	Exterior Building Facade/Landscape Lighting Power Density (LPD): Tabulation for exterior building facade/landscape lighting indicating, for each location identification or description, units of measure, area or distance of the location, actual LPD using units consistent with ASHRAE 90.1, and the ASHRAE allowable LPD for that type of location. Percentage calculation of actual versus allowable LPD for all building facade/landscape lighting.		ELEC
			Final Design	Exterior Lighting IESNA Zone: Indicate which IESNA zone is applicable to the project.		ELEC
			Final Design	Exterior Lighting Site Lumen table indicating, for each fixture type, quantity installed, initial lamp lumens per luminaire, initial lamp lumens above 90 degrees from Nadir, total lamp lumens and total lamp lumens above 90 degrees. Percentage of site lamp lumens above 90 degrees from nadir to total lamp lumens.		ELEC
			Final Design	Exterior Lighting Narrative describing analysis used for addressing requirements for light trespass at site boundary and beyond.		ELEC
<b>CATEGORY 2 – WATER EFFICIENCY</b>						
WE1.1		Water Efficient Landscaping: Reduce by 50%	Final Design	Statement indicating which option for compliance applies.		CIV
OCT09REV			**Final Design	Delineation and labeling of "LEED Project site boundary" on site plan.		CIV
			Final Design	Calculation indicating, for baseline and design case, total water applied, total potable water applied, total non-potable water applied. Design case percent potable water reduction. If nonpotable water is used, indicate source of nonpotable water.		CIV
			Final Design	List of landscape plan drawings.		CIV
			Final Design	Narrative describing landscaping and irrigation design strategies, including water use calculation methodology used to determine savings and, if non-potable water is used, specific information about source and available quantity.		CIV
WE1.2		Water Efficient Landscaping: No Potable Water Use or No Irrigation	Same as WE1.1	Same as WE1.1		CIV
WE2		Innovative Wastewater Technologies	Final Design	Statement confirming which option for compliance applies.		MEC

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PAR		FEATURE	DUE AT	REQUIRED DOCUMENTATION	DATE	REV
			Final Design	Statement confirming which occupancy breakdown applies (default or special). For special occupancy breakdown, indicate source and explanation for ratio.		MEC
			Final Design	Occupancy calculation including male/female numbers for FTEs, visitors, students, customers, residential and other type occupants/users		MEC
			Final Design	Statement indicating percent of male restrooms with urinals. Statement indicating annual days of operation.		MEC
			Final Design	Baseline flush fixture calculation spreadsheet indicating, for each fixture type, gender, flush rate, daily uses per person for each occupant type identified in occupancy calculation and annual baseline flush fixture water usage.		MEC
			Final Design	Design case flush fixture calculation spreadsheet indicating, for each fixture type, gender, fixture manufacturer, fixture model number, flush rate, percent of occupants using this fixture type, daily uses per person for each occupant type identified in occupancy calculation and annual design case flush fixture water usage.		MEC
			Final Design	Option 1: If onsite non-potable water is used, identify source(s), indicate annual quantity from each source and indicate total annual quantity from all onsite non-potable water sources.		MEC
			Final Design	Option 1: Summary calculation indicating baseline annual water consumption, design case annual water consumption, non-potable annual water consumption and total percentage annual water savings.		MEC
			Final Design	Option 2: Statement confirming on-site treatment of all generated wastewater to tertiary standards and all treated wastewater is either infiltrated or used on-site.		MEC
			Final Design	Option 2: List of drawing and specification references that convey design of on-site wastewater treatment features.		CIV
			Final Design	Option 2: On-site water treatment quantity calculation indicating all on-site wastewater source(s), annual quantity treated, annual quantity infiltrated and annual quantity re-used on site from each source and totals for annual quantity treated, annual quantity infiltrated and annual quantity re-used on site from all sources.		CIV
			Final Design	Option 2: Wastewater summary calculation indicating design case annual flush fixture water usage, annual on-site water treatment and percentage sewage conveyance reduction.		MEC
			Final Design	Narrative describing project strategy for reduction of potable water use for sewage conveyance, including specific information on reclaimed water usage and treated wastewater usage.		MEC
WE3.1		Water Use Reduction: 20% Reduction	Final Design	Statement confirming which occupancy breakdown applies (default or special). For special occupancy breakdown, indicate source and explanation for ratio.		MEC
			Final Design	Occupancy calculation including male/female numbers for FTEs, visitors, students, customers, residential and other type occupants/users		MEC
			Final Design	Statement indicating percent of male restrooms with urinals. Statement indicating annual days of operation.		MEC
			Final Design	Baseline flush fixture calculation spreadsheet indicating, for each fixture type, gender, flush rate, daily uses per person for each occupant type identified in occupancy calculation and annual baseline flush fixture water usage.		MEC
			Final Design	Design case flush fixture calculation spreadsheet indicating, for each fixture type, gender, fixture manufacturer, fixture model number, flush rate, percent of occupants using this fixture type, daily uses per person for each occupant type identified in occupancy calculation and annual design case flush fixture water usage.		MEC
			Closeout	X Manufacturer published product data or certification confirming fixture water usage.		PE
WE3.2		Water Use Reduction: 30% Reduction	Same as WE3.1	Same as WE3.1		MEC
<b>CATEGORY 3 – ENERGY AND ATMOSPHERE</b>						
EAPR1		Fundamental Commissioning of the Building Energy Systems (PREREQUISITE)	**Final Design	**Owner's Project Requirements document		ALL
			**Final Design	**Basis of Design document for commissioned systems		MEC, ELEC
			**Final Design	**Commissioning Plan		MEC, ELEC

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PAR		FEATURE	DUE AT	REQUIRED DOCUMENTATION	DATE	REV
			Closeout	Statement confirming all commissioning requirements have been incorporated into construction documents.		PE
			Closeout	Commissioning Report		PE
EAPR2		Minimum Energy Performance (PREREQUISITE)	Final Design	Statement listing the mandatory provisions of ASHRAE 90.1 that project meets relative to compliance with this prerequisite and indicating which compliance path was used.		MEC ELEC ARC
EAPR3		Fundamental Refrigerant Management (PREREQUISITE)	Final Design	Statement indicating which option for compliance applies.		MEC
			Final Design	Option 2: Narrative describing phase out plan, including specific information on phase out dates and refrigerant quantities.		MEC
EA1		Optimize Energy Performance	Final Design	Statement indicating which compliance path option applies.		MEC
			Final Design	Option 1: Statement confirming simulation software capabilities and confirming assumptions and methodology.		MEC
			Final Design	Option 1: General information including simulation program, principal heating source, percent new construction and renovation, weather file, climate zone and Energy Star Target Finder score.		MEC
			Final Design	Option 1: Space summary listing, for each building use, the conditioned area, unconditioned area and total area and include total area for each category		MEC
			Final Design	Option 1: List of all simulation output advisory message data and show difference between baseline and proposed design		MEC
			Final Design	Option 1: Comparison summary for energy model inputs including description of baseline and design case energy model inputs, showing both by element type		MEC
			Final Design	Option 1: Energy type summary listing, for each energy type, utility rate description, units of energy and units of demand		MEC
			Final Design	Option 1: Statement indicating whether project uses on-site renewable energy. If yes, list all sources and indicate, for each source, backup energy type, annual energy generated, rated capacity and renewable energy cost		MEC
			Final Design	Option 1: If analysis includes exceptional calculation methods, statement describing how exceptional calculation measure cost savings is determined		MEC
			Final Design	Option 1: If analysis includes exceptional calculation methods, for each exceptional calculation method indicate energy types and, for each energy type, annual energy savings, annual cost savings, and brief descriptive narrative		MEC
			Final Design	Option 1: Baseline performance rating compliance report table indicating, for each energy end use, whether it is a process load, energy type, annual and peak energy demand for all four orientations. For each orientation indicate total annual energy use for each orientation and total annual process energy use.		MEC
			Final Design	Option 1: Baseline energy cost table indicating, for each energy type, annual cost for all four orientations and building total energy cost.		MEC
			Final Design	Option 1: Proposed Design performance rating compliance report table indicating, for each energy end use, whether it is a process load, energy type, annual and peak energy demand, baseline annual and peak energy demand and percent savings. Indicate total annual energy use and total annual process energy use for both proposed design and baseline and percent savings.		MEC
			Final Design	Option 1: Proposed Design energy cost table indicating, for each energy type, annual cost for all four orientations and building total energy cost.		MEC
			Final Design	Option 1: Energy cost and consumption by energy type report indicating, for each energy type, proposed design and baseline annual use and annual cost, percent savings annual use and annual cost. Indicate for renewable energy annual energy generated and annual cost. Indicate exceptional calculations annual energy savings and annual cost savings. Indicate building total annual energy use, annual energy cost for proposed design and baseline and indicate percent savings annual energy use and annual energy cost.		MEC

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			Final Design	Option 1: Compliance summaries from energy simulation software. If software does not produce compliance summaries provide output summaries and example input summaries for baseline and proposed design supporting data in the tables. Output summaries must include simulated energy consumption by end use and total energy use and cost by energy type. Example input summaries should represent most common systems and must include occupancy, use pattern, assumed envelope component sizes and descriptive features and assumed mechanical equipment types and descriptive features		MEC
			Final Design	Option 1: Energy rate tariff from project energy providers (only if not using LEED Reference Guide default rates)		MEC
EA2.1		On-Site Renewable Energy	Final Design	Statement indicating which compliance path option applies.		ELEC
			Final Design	List all on-site renewable energy sources and indicate, for each source, backup energy type, annual energy generated, rated capacity and renewable energy cost. Indicate total annual energy use (all sources), total annual energy cost (all sources) and percent renewable energy cost.		ELEC MEC
			Final Design	Option 1: Indicate, for renewable energy, proposed design total annual energy generated and annual cost.		ELEC MEC
			Final Design	Option 2: Indicate CBECS building type and building gross area. Provide the following CBECS data: median annual electrical intensity, median annual non-electrical fuel intensity, average electric energy cost, average non-electric fuel cost, annual electric energy use and cost, annual non-electric fuel use and cost.		ELEC MEC
			Final Design	Option 2: Narrative describing renewable systems and explaining calculation method used to estimate annual energy generated, including factors influencing performance.		ELEC MEC
EA2.2		On-Site Renewable Energy	Same as EA2.1	Same as EA2.1		ELEC MEC
EA2.3		On-Site Renewable Energy	Same as EA2.1	Same as EA2.1		ELEC MEC
EA3		Enhanced Commissioning	**Final Design	**Owner's Project Requirements document (OPR)		ALL
			**Final Design	**Basis of Design document for commissioned systems (BOD)		ELEC MEC
			**Final Design	**Commissioning Plan		ELEC MEC
			Closeout	Statement confirming all commissioning requirements have been incorporated into construction documents.		PE
			Closeout	**Commissioning Report		PE
			**Final Design	Statement by CxA confirming Commissioning Design Review		
			Closeout	Statement by CxA confirming review of Contractor submittals for compliance with OPR and BOD		PE
			Closeout	**Systems Manual		PE
			Closeout	Statement by CxA confirming completion of O&M staff and occupant training		PE
			Closeout	**Scope of work for post-occupancy review of building operation, including plan for resolution of outstanding issues		PE
			**Predesign	Statement confirming CxA qualifications and contractual relationships relative to work on this project, demonstrating that CxA is an independent third party.		MEC
EA4		Enhanced Refrigerant Management	Final Design	Refrigerant impact calculation table with all building data and calculation values as shown in LEED 2.2 Reference Guide Example Calculations		MEC
			Final Design	Narrative describing any special circumstances or explanatory remarks OCT09REV		
			Closeout	X Cut sheets highlighting refrigerant data for all HVAC components.		PE
EA5		Measurement & Verification	Closeout	Statement indicating which compliance path option applies.		PE
			Closeout	Measurement and Verification Plan		PE
			Closeout	**Scope of work for post-occupancy implementation of M&V plan		PE
EA6		Green Power	Closeout	Statement indicating which compliance path option applies.		PE
			Closeout	Option 1: Indicate proposed design total annual electric energy usage		PE
			Closeout	Option 2: Indicate actual total annual electric energy usage		PE
			Closeout	Option 3: Calculation indicating building type, total gross area, median electrical intensity and annual electric energy use		PE

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			Closeout	Green power provider summary table indicating, for each purchase type, provider name, annual quantity green power purchased and contract term. Indicate total annual green power use and indicate percent green power		PE
			Closeout	Narrative describing how Green Power or Green Tags are purchased		PE
<b>CATEGORY 4 – MATERIALS AND RESOURCES</b>						
MRPR1		Storage & Collection of Recyclables (PREREQUISITE)	Final Design	Statement confirming that recycling area will accommodate recycling of plastic, metal, paper, cardboard and glass. Narrative indicating any other materials addressed and coordination with pickup.		ARC
MR1.1		Building Reuse: Maintain 75% of Existing Walls, Floors & Roof	**Final Design	If project includes a building addition, confirm that area of building addition does not exceed 2x the area of the existing building.		ARC
			**Final Design	Spreadsheet listing, for each building structural/envelope element, the existing area and reused area. Total percent reused.		ARC
MR1.2		Building Reuse: Maintain 95% of Existing Walls, Floors & Roof	Same as MR1.1	Same as MR1.1		ARC
MR1.3		Building Reuse: Maintain 50% of Interior Non-Structural Elements	**Final Design	If project includes a building addition, confirm that area of building addition does not exceed 2x the area of the existing building.		ARC
			**Final Design	Spreadsheet listing, for each building interior non-structural element, the existing area and reused area. Total percent reused.		ARC
MR2.1		Construction Waste Management: Divert 50% From Disposal	**Preconstruction	Waste Management Plan		PE
			**Construction Quarterly and Closeout	Spreadsheet calculations indicating material description, disposal/diversion location (or recycling hauler), weight, total waste generated, total waste diverted, diversion percentage		PE
			**Construction Quarterly and Closeout	OCT09REV		
			**Construction Quarterly and Closeout	Receipts/tickets for all items on spreadsheet		PE
MR2.2		Construction Waste Management: Divert 75% From Disposal	Same as MR2.1	Same as MR2.1		PE
MR3.1		Materials Reuse: 5%	Closeout	Statement indicating total materials value and whether default or actual.		PE
			Closeout	Spreadsheet calculations indicating, for each reused/salvaged material, material description, source or vendor, cost. Total reused/salvaged materials percentage.		PE
MR3.2		Materials Reuse: 10%	Same as MR3.1	Same as MR3.1		PE
MR4.1		Recycled Content: 10% (post-consumer + 1/2 pre-consumer)	Closeout	Statement indicating total materials value and whether default or actual.		PE
			Closeout	Spreadsheet calculations indicating, for each recycled content material, material name/description, manufacturer, cost, post-consumer recycled content percent, pre-consumer recycled content percent, source of recycled content data. Total post-consumer content materials cost, total pre-consumer content materials cost, total combined recycled content materials cost, recycled content materials percentage.		PE
			Final Design or NLT Preconstruction	**Purchasing Plan consisting of spreadsheet indicated above, filled in with estimated quantities to show strategy for achieving goal. OCT09REV		PE
			Closeout	Manufacturer published product data or certification, confirming recycled content percentages in spreadsheet		PE
MR4.2		Recycled Content: 20% (post-consumer + 1/2 pre-consumer)	Same as MR4.1	Same as MR4.1		PE
MR5.1		Regional Materials: 10% Extracted, Processed & Manufactured Regionally	Closeout	Statement indicating total materials value and whether default or actual.		PE
			Closeout	Spreadsheet calculations indicating, for each regional material, material name/description, manufacturer, cost, percent compliant, harvest distance, manufacture distance, source of manufacture and harvest location data. Total regional materials cost, regional materials percentage.		PE
			Preconstruction OCT09REV	**Purchasing Plan consisting of spreadsheet indicated above, filled in with estimated quantities to show strategy for achieving goal. OCT09REV		PE
			Closeout	Manufacturer published product data or certification confirming regional material percentages in spreadsheet		PE

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MR5.2		Regional Materials:20% Extracted, Processed & Manufactured Regionally	Same as MR5.1	Same as MR5.1	PE
MR6		Rapidly Renewable Materials	Closeout	Statement indicating total materials value and whether default or actual.	PE
			Closeout	Spreadsheet calculations indicating, for each rapidly renewable material, material name/description, manufacturer, cost, rapidly renewable content percent, rapidly renewable product value. Total rapidly renewable product value, rapidly renewable materials percentage.	PE
			Final Design OCT09REV	**Purchasing Plan consisting of spreadsheet indicated above, filled in with estimated quantities to show strategy for achieving goal. OCT09REV	ARC
			Closeout X	Manufacturer published product data or certification confirming rapidly renewable material percentages in spreadsheet	PE
MR7		Certified Wood	Closeout	Statement indicating total materials value and whether default or actual.	PE
			Closeout	Spreadsheet calculations indicating, for each certified wood material, material name/description, vendor, cost, wood component percent, certified wood percent of wood component, FSC chain of custody certificate number. Total certified wood product value, certified wood materials percentage.	PE
			Final Design or NLT Preconstruction	**Purchasing Plan consisting of spreadsheet indicated above, filled in with estimated quantities to show strategy for achieving goal. OCT09REV	PE
			Closeout X	Vendor invoices, FSC chain of custody certificates and manufacturer published product data or certification confirming all certified wood materials percentages in spreadsheet.	PE
<b>CATEGORY 5 – INDOOR ENVIRONMENTAL QUALITY</b>					
EQPR1		Minimum IAQ Performance (PREREQUISITE)	Final Design	Statement indicating which option for compliance applies, stating applicable criteria/requirement, and confirming that project has been designed to meet the applicable requirements.	MEC
			Final Design	Narrative describing the project's ventilation design, including specifics about fresh air intake volumes and special considerations.	MEC
EQPR2		Environmental Tobacco Smoke (ETS) Control (PREREQUISITE)	Final Design	Statement indicating which option for compliance applies, stating applicable criteria/requirement, and confirming that project has been designed to meet the applicable requirements.	ARC
			Final Design	List of drawing and specification references that convey conformance to applicable requirements (signage, exhaust system, room separation details, etc).	ARC
EQ1		Outdoor Air Delivery Monitoring	Final Design	Statement indicating which option for compliance applies and confirming that project has been designed to meet the applicable requirements.	MEC
			Final Design	List of drawing and specification references that convey conformance to applicable requirements.	MEC
			Final Design	Narrative describing the project's ventilation design and CO2 monitoring system, including specifics about monitors, operational parameters and setpoints.	MEC
			Closeout X	Cut sheets for CO2 monitoring system.	PE
EQ2		Increased Ventilation	Final Design	Statement indicating which option for compliance applies and confirming that project has been designed to meet the applicable requirements.	MEC
			Final Design	Narrative describing the project's ventilation design, including specifics about zone fresh air intake volumes and demonstrating compliance.	MEC
			Final Design	Option 2: Narrative describing design method used for determining natural ventilation design, including calculation methodology/model results and demonstrating compliance.	MEC
			Final Design	List of drawing and specification references that convey conformance to applicable requirements.	MEC
EQ3.1		Construction IAQ Management Plan: During Construction	**Preconstruction	Construction IAQ Management Plan	PE
			Closeout	Statement confirming whether air handling units were operated during construction	PE
			Closeout	Dated jobsite photos showing examples of IAQ management plan practices being implemented. Label photos to indicate which practice they demonstrate. Minimum one photo of each practice at each building.	PE
			Closeout	Spreadsheet indicating, for each filter installed during construction, the manufacturer, model number, MERV rating, location installed, and if it was replaced immediately prior to occupancy.	PE
EQ3.2		Construction IAQ Management Plan: Before Occupancy	**Preconstruction	Construction IAQ Management Plan	PE

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			Closeout	Statement indicating which option for compliance applies and confirming that required activities have occurred that meet the applicable requirements.		PE
			Closeout	Option 1a: Narrative describing the project's flushout process, including specifics about temperature, airflow and duration, special considerations (if any) and demonstrating compliance.		PE
			Closeout	Option 1b: Narrative describing the project's pre-occupancy and post-occupancy flushout processes, including specifics about temperature, airflow and duration, special considerations (if any) and demonstrating compliance.		PE
			Closeout	Option 2: Narrative describing the project's IAQ testing process, including specifics about contaminants tested for, locations, remaining work at time of test, retest parameters and special considerations (if any).		PE
			Closeout	Option 2: IAQ testing report demonstrating compliance.		PE
EQ4.1		Low Emitting Materials: Adhesives & Sealants	Closeout	Spreadsheet indicating, for each applicable indoor adhesive, sealant and sealant primer used, the manufacturer, product name/model number, VOC content, LEED VOC limit, and source of VOC data.		PE
			Closeout	Spreadsheet indicating, for each applicable indoor aerosol adhesive, the manufacturer, product name/model number, VOC content, LEED VOC limit, and source of VOC data - OR - Statement confirming no indoor aerosol adhesives were used for the project.		PE
			Closeout	X Manufacturer published product data or certification confirming material VOCs in spreadsheet		PE
EQ4.2		Low Emitting Materials: Paints & Coatings	Closeout	Spreadsheet indicating, for each applicable indoor paint and coating used, the manufacturer, product name/model number, VOC content, LEED VOC limit, and source of VOC data.		PE
			Closeout	Spreadsheet indicating, for each applicable indoor anti-corrosive/anti-rust paint and coating used, the manufacturer, product name/model number, VOC content, LEED VOC limit, and source of VOC data - OR - Statement confirming no indoor anti-corrosive/anti-rust paints were used for the project .		PE
			Closeout	X Manufacturer published product data or certification confirming material VOCs in spreadsheet		PE
EQ4.3		Low Emitting Materials: Carpet Systems	Closeout	Spreadsheet indicating, for each indoor carpet used, the manufacturer, product name/model number, if it meets LEED requirement (yes/no) and source of LEED compliance data.		PE
			Closeout	Spreadsheet indicating, for each indoor carpet cushion used, the manufacturer, product name/model number, if it meets LEED requirement (yes/no) and source of LEED compliance data - OR - Statement confirming no indoor carpet cushion was used for the project.		PE
			Closeout	X Manufacturer published product data or certification confirming material CRI label in spreadsheet		PE
EQ4.4		Low Emitting Materials: Composite Wood & Agrifiber Products	Closeout	Spreadsheet indicating, for each indoor composite wood and agrifiber product used, the manufacturer, product name/model number, if it contains added urea formaldehyde (yes/no) and source of LEED compliance data.		PE
			Closeout	X Manufacturer published product data or certification confirming material urea formaldehyde in spreadsheet		PE
EQ5		Indoor Chemical & Pollutant Source Control	Closeout OCT09REV	Spreadsheet indicating, for each permanent entryway system used, the manufacturer, product name/model number and description of system. Roll-up and carpet systems requiring weekly cleaning to earn this credit are not a permitted option for Army projects.		PE
			Final Design	List of drawing and specification references that convey locations and installation methods for entryway systems.		ARC
			Final Design	Spreadsheet indicating, for each chemical use area, the room number, room name, description of room separation features (walls, floor/ceilings, openings) and pressure differential from surrounding spaces with doors closed - OR - Statement confirming that project includes no chemical use areas and that no hazardous cleaning materials are needed for building maintenance.		ARC MEC
			Final Design	If project includes chemical use areas: List of drawing and specification references that convey locations of chemical use areas, room separation features and exhaust system.		ARC MEC
			Closeout OCT09REV	If project includes chemical use areas: Spreadsheet indicating, for AHUs/mechanical ventilation equipment serving occupied areas, the manufacturer, model number, MERV rating, location installed, and if it was replaced immediately prior to occupancy (yes/no) - OR - Statement confirming that project does not use mechanical equipment for ventilation of occupied areas.		PE

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EQ6.1		Controllability of Systems: Lighting	Final Design	Calculation indicating total number of individual workstations, number of workstations with individual lighting controls and the percentage of workstations with individual lighting controls.		ELEC
			Final Design	For each shared multi-occupant space, provide a brief description of lighting controls.		ELEC
			Final Design	Narrative describing lighting control strategy, including type and location of individual controls and type and location of controls in shared multi-occupant spaces.		ELEC
EQ6.2		Controllability of Systems: Thermal Comfort	Final Design	Calculation indicating total number of individual workstations, number of workstations with individual thermal comfort controls and the percentage of workstations with individual thermal comfort controls.		MEC
			Final Design	For each shared multi-occupant space, provide a brief description of thermal comfort controls.		MEC
			Final Design	Narrative describing thermal comfort control strategy, including type and location of individual and shared multi-occupant controls.		MEC
EQ7.1		Thermal Comfort: Design	Final Design	Design criteria spreadsheet indicating, for spring, summer, fall and winter, maximum indoor space design temperature, minimum indoor space design temperature and maximum indoor space design humidity.		MEC
			Final Design	Narrative describing method used to establish thermal comfort control conditions and how systems design addresses the design criteria, including compliance with the referenced standard.		MEC
EQ7.2		Thermal Comfort: Verification	Final Design	Narrative describing the scope of work for the thermal comfort survey, including corrective action plan development		MEC
EQ8.1		Daylight & Views: Daylight 75% of Spaces	Final Design	Option 1: Table indicating all regularly occupied spaces with space area and space area with 2% daylighting factor. Sum of regularly occupied areas and regularly occupied areas with 2% daylighting factor. Percentage calculation of areas with 2% daylighting factor to total regularly occupied areas.		ARC
			Final Design	Option 1: Glazing factor calculation table		ARC
			Final Design	Option 2: Simulation model method, software and output data		ARC
			Final Design	Option 2: Table indicating all regularly occupied spaces with space area, space area with minimum 25 footcandles daylighting illumination, and method of providing glare control. Sum of regularly occupied areas and regularly occupied areas with 25 fc daylighting. Percentage calculation of areas with 25 fc daylighting to total regularly occupied areas.		ARC
			Final Design	For all occupied spaces excluded from the calculation, provide narrative indicating reasons for excluding the space.		ARC
			Final Design	List of drawing and specification references that convey exterior glazed opening head and sill heights and glazing performance properties.		ARC
			Closeout	Manufacturer published product data or certification confirming glazing Tvis in spreadsheet		PE
EQ8.2		Daylight & Views: Views for 90% of Spaces	Final Design	Table indicating all regularly occupied spaces with space area and space area with access to views. Sum of regularly occupied areas and regularly occupied areas with access to views. Percentage calculation of areas with views to total regularly occupied areas.		ARC
			Final Design	For all occupied spaces excluded from the calculation, provide narrative indicating reasons for excluding the space.		ARC
			Final Design	LEED Floor plan drawings showing line of sight diagramming of views areas in each regularly occupied space. List of drawing/specification references that convey exterior glazed opening head and sill heights.		ARC
<b>CATEGORY 6 – FACILITY DELIVERY PROCESS</b>						
IDc1.1		Innovation in Design	Final Design OCT09REV	Narrative describing intent, requirement for credit, project approach to the credit. List of drawings and specification references that convey implementation of credit. All other documentation that validates claimed credit.		
IDc1.2		Innovation in Design	Final Design OCT09REV			
IDc1.3		Innovation in Design	Final Design OCT09REV			
IDc1.4		Innovation in Design	Final Design OCT09REV			
IDc2		LEED Accredited Professional	Final Design	Narrative indicating name of LEED AP, company name of LEED AP, description of LEED AP's role and responsibilities in the project.		ARC



**ATTACHMENT F**  
Version 07-07-2010

**BUILDING INFORMATION MODELING REQUIREMENTS**

**1.0 Section 1 - Submittal Format**

1.1. Design Deliverables. Develop all designs using Building Information Modeling (BIM) and Computer Aided Design (CAD) software. Design submittal drawings shall be 22 x 34 size, suitable for half-size scaled reproduction.

**2.0 Section 2 – Design Requirements**

2.1. BIM Model and Facility Data. Contractor shall use BIM application(s) and software(s) to develop project designs. "Facility Data" is defined as associated intelligent attribute data. The "Model" is defined as 3D graphics that includes Facility Data and output as described in the paragraph 'Output' below. Contractors will use the Model to produce accurate Construction Documents. For each Center of Standardization (CoS) facility type included in this project, all BIM Models and associated Facility Data shall be submitted in Bentley Systems BIM V8 with associated USACE Bentley BIM Workspace (which includes specific standard BIM libraries and definitions). This Workspace can be downloaded from the CAD/BIM Technology Center. [Where available, the workspace will be specific to this CoS Facility Standard Design. The Contractor will be provided a baseline multi-discipline BIM Project Model for the CoS Facility Standard Design type, where such a model exists (for the purposes of site adaptation).] The USACE Bentley BIM Workspace is dependent on specific versions of the Bentley BIM suite of products and only the versions of the software that are listed in the Contractor instructions included with the USACE BIM Workspace are permitted to be used.

2.1.1. Reference. Refer to ERDC TR-06-10, "U.S. Army Corps of Engineers Building Information Modeling Road Map" from the CAD/BIM Technology Center website for more information on the USACE BIM implementation goals.

2.2. Drawings. Deliver CAD files used for the creation of the Construction Documents Drawings per requirements in Section 01 33 16, the criteria of the USACE CESAS District, and as noted herein. Specification of a CAD file format for these Drawings does not limit which BIM application(s) or software(s) may be used for project development and execution.

2.2.1. IFC Support. The Contractor's selected BIM application(s) and software(s) must support the IFC (Industry Foundation Class - see [www.iai-tech.org](http://www.iai-tech.org)). Submit any deviations from or additions to the IFC property sets for any new spaces, systems, and equipment for Government approval.

2.2.2. Submittal Requirements. BIM submittals shall be fully interoperable, compatible, and editable with the Bentley BIM tools. Use the specified version of the USACE Bentley BIM Workspace and conform to the requirements of **Sections 3 and 4 below**.

2.2.3. BIM Project Execution Plan.

2.2.3.1. Develop a BIM Project Execution Plan ("Plan" or "PxP") documenting the BIM and analysis technologies selected for the Project Model (integrated with the AEC CAD Standard) from concept development through As-Builts as a design, production, coordination, construction, and documentation tool and the collaborative process by which it shall be executed. See Section 7 for additional guidance on developing the Plan.

2.2.4. BIM Requirements..

2.2.4.1. Facility Data. Develop the Facility Data consisting of a set of intelligent elements for the Model (e.g., doors, air handlers, electrical panels). This Facility Data shall include all material definitions and attributes that are necessary for the Project facility design and construction. Additional data in support of Section 6 Contractor Electives is encouraged.

2.2.4.2. Model Content. The Model and Facility Data shall include, at a minimum, the requirements of Section 4 below.

2.2.4.3. Model Granularity. Models may vary in level of detail for individual elements within a model, but at a minimum must include all features that would be included on a quarter inch (1/4" = 1'0") scaled drawing (e.g. at least 1/16<sup>th</sup>, 1/8<sup>th</sup> and 1/4<sup>th</sup>), or appropriately scaled civil drawings.

2.2.4.4. Output. Submitted CAD drawings (e.g., plans, elevations, sections, schedules, details, etc.) shall be derived (commonly known as extractions, views or sheets) and maintained from the submitted Model and Facility Data.

2.3. Quality Control. Implement quality control (QC) parameters for the Model, including:

2.3.1. Model Standards Checks. QC validation used to ensure that the Project Facility Data set has no undefined, incorrectly defined or duplicated elements. Report non-compliant elements and corrective action plan to correct non-compliant elements. Provide the government with detailed justification and request government approval for any non-compliant element which the contractor proposes to be allowed to remain in the Model.

2.3.2. CAD Standards Checks. QC checking performed to ensure that the fonts, dimensions, line styles, levels and other construction document formatting issues are followed per the A/E/C CADD Standard.

2.3.3. Other Parameters. Develop such other QC parameters as Contractor deems appropriate for the Project and provide to the Government for concurrence.

2.4. Design and Construction Reviews. Perform design and construction reviews at each submittal stage under Section 3 to test the Model, including:

2.4.1. Visual Checks. Checking to ensure the design intent has been followed and that there are no unintended elements in the Model.

2.4.2. Interference Management Checks. Locate conflicting spatial data in the Model where two elements are occupying the same space. Log hard interferences (e.g., mechanical vs. structural or mechanical vs. mechanical overlaps in the same location) and soft interferences, (e.g., conflicts regarding equipment clearance, service access, fireproofing, insulation) in a written report and resolve.

2.4.3. IFC Coordination View. Provide an IFC Coordination View in IFC Express format for all deliverables. Provide exported property set data for all IFC supported named building elements.

2.4.4. Other Parameters. Develop such other Review parameters as the Contractor deems appropriate for the Project and provide to the Government for concurrence..

### **3.0 Section 3 – Design Stage Submittal Requirements**

3.1. General Submittal Requirements.

3.1.1. Provide submittals in compliance with BIM Project Execution Plan deliverables at stages as described hereinafter.

3.1.2. At each Stage in Paragraphs 3.3 through 3.6, provide a Contractor-certified written report confirming that consistency checks as identified in Paragraphs 2.3 and 2.4 have been completed. This report shall be discussed as part of the review process and shall address cross-discipline interferences, if any.

3.1.3. At each Stage in Paragraphs 3.3 through 3.6, provide the Government with:

- The Model, Facility Data, Workspace and CAD Data files in native Bentley BIM/CAD.

- A 3-D interactive review format of the Model in Bentley Navigator, Autodesk Navisworks, Adobe 3D PDF 7.0 (or later), Google Earth KMZ or other format per Plan requirements. The file format for reviews can change between submittals.

- A list of all submitted files. The list should include a description, directory, and file name for each file submitted. For all CAD sheets, include the sheet title and sheet number. Identify files that have been produced from the submitted Model and Facility Data.

3.1.4. The Government will confirm acceptability of all submittals identified in Section 3 in coordination with the USACE CESAS BIM Manager

3.2. Initial Design Conference Submittal.

3.2.1. Submit a digital copy of the Plan where, in addition to Paragraph 3.1.4, the USACE Geographic District BIM Manager will coordinate with the USACE CoS BIM Manager to confirm acceptability of the Plan or advise as to additional processes or activities necessary to be incorporated.

3.2.2. Within thirty (30) days after the approval of the Plan, conduct a demonstration to review the Plan for clarification, and to verify the functionality of Model technology workflow and processes. If modifications are required, the Contractor shall complete the modifications and resubmit the Plan and perform subsequent demonstration for Government acceptance. There will be no payment for design or construction until the Plan is acceptable to the Government. The Government may also withhold payment for design and construction for unacceptable performance in executing the approved Plan.

3.3. Interim Design Submittals.

3.3.1. BIM and CAD Data. The Model shall include the requirements identified in Paragraph 2.2.4 as applicable to the Interim Design package(s).

3.4. Final Design Submissions and Design Complete Submittals.

3.4.1. BIM and CAD Data. The Model shall include the requirements identified in Paragraph 2.2.4. Acceptance according to Paragraph 3.1.4 is required before commencement of construction, as described in Paragraph 3.7.6 of Section 01 33 16.

3.5. Construction Submittals – Over-The-Shoulder Progress Reviews. Periodic quality control meetings or construction progress review meetings shall include quality control reviews on the implementation and use of the Model, including interference management and design change tracking information.

3.6. Final As-Built BIM and CAD Data Submittal. Submit the final Model, Facility Data, and CAD files reflecting as-built conditions for Government Approval, as specified in Section 01 78 02.00 10, PROJECT CLOSEOUT.

#### **4.0 Section 4 – BIM Model Minimum Requirements and Output**

4.1. General Provisions. The deliverable Model shall be developed to include the systems described below as they would be built and the processes of installing them, and to reflect final as-built conditions. The deliverable model at the interim design stage and at the final design stage (“released for construction”) shall be developed to include as many of the systems described below as are necessary and appropriate at that design stage.

4.2. Architectural/Interior Design. The Architectural systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4”=1’0”) scaled drawing. Additional minimum Model requirements include:

4.2.1. Spaces. The Model shall include spaces defining accurate net square footage and net volume, and holding data for the room finish schedule for including room names and numbers. Include Programmatic Information provided by the Government or validated program to verify design space against programmed space, using this information to validate area quantities.

4.2.2. Walls and Curtain Walls. Each wall shall be depicted to the exact height, length, width and ratings (thermal, acoustic, fire) to properly reflect wall types. The Model shall include all walls, both interior and exterior, and the necessary intelligence to produce accurate plans, sections and elevations depicting these design elements.

- 4.2.3. Doors, Windows and Louvers. Doors, windows and louvers shall be depicted to represent their actual size, type and location. Doors and windows shall be modeled with the necessary intelligence to produce accurate window and door schedules.
- 4.2.4. Roof. The Model shall include the roof configuration, drainage system, penetrations, specialties, and the necessary intelligence to produce accurate plans, building sections and generic wall sections where roof design elements are depicted.
- 4.2.5. Floors. The floor slab shall be developed in the structural Model and then referenced by the architectural Model for each floor of the Project building.
- 4.2.6. Ceilings. All heights and other dimensions of ceilings, including soffits, ceiling materials, or other special conditions shall be depicted in the Model with the necessary intelligence to produce accurate plans, building sections and generic wall sections where ceiling design elements are depicted.
- 4.2.7. Vertical Circulation. All continuous vertical components (i.e., non-structural shafts, architectural stairs, handrails and guardrails) shall be accurately depicted and shall include the necessary intelligence to produce accurate plans, elevations and sections in which such design elements are referenced.
- 4.2.8. Architectural Specialties and Woodwork. All architectural specialties (i.e., toilet room accessories, toilet partitions, grab bars, lockers, and display cases) and woodwork (i.e., cabinetry and counters) shall be accurately depicted with the necessary intelligence to produce accurate plans, elevations and sections in which such design elements are referenced.
- 4.2.9. Signage. The Model shall include all signage and the necessary intelligence to produce accurate plans and schedules.
- 4.2.10. Schedules. Provide door, window, hardware sets using BHMA designations, flooring, wall finish, and signage schedules from the Model, indicating the type, materials and finishes used in the design.
- 4.3. Furniture. The furniture systems Model may vary in level of detail for individual elements within a Model, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing, and have necessary intelligence to produce accurate plans. Representation of furniture elements is to be 2D. Contractor may provide a minimal number of 3D representations as examples. Examples of furniture include, but are not limited to, desks, furniture systems, seating, tables, and office storage.
- 4.3.1. Furniture Coordination. Furniture that makes use of electrical, data or other features shall include the necessary intelligence to produce coordinated documents and data.
- 4.4. Equipment. The Model may vary in level of detail for individual elements within a Model. Equipment shall be depicted to meet layout requirements with the necessary intelligence to produce accurate plans and minimum schedules depicting their configuration. Examples of equipment include but are not limited to copiers, printers, refrigerators, ice machines and microwaves.
- 4.4.1. Schedules. Provide furniture and equipment schedules from the model indicating the materials, finishes, mechanical, and electrical requirements.
- 4.5. Structural. The structural systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing. Additional minimum Model requirements include:
- 4.5.1. Foundations. All necessary foundation and/or footing elements, with necessary intelligence to produce accurate plans and elevations
- 4.5.2. Floor Slabs. Structural floor slabs shall be depicted, including all necessary recesses, curbs, pads, closure pours, and major penetrations accurately depicted.

4.5.3. Structural Steel. All steel columns, primary and secondary framing members, and steel bracing for the roof and floor systems (including decks), including all necessary intelligence to produce accurate structural steel framing plans and related building/wall sections.

4.5.4. Cast-in-Place Concrete. All walls, columns, and beams, including necessary intelligence to produce accurate plans and building/wall sections depicting cast-in-place concrete elements.

4.5.5. Expansion/Contraction Joints. Joints shall be accurately depicted.

4.5.6. Stairs. The structural Model shall include all necessary openings and framing members for stair systems, including necessary intelligence to produce accurate plans and building/wall sections depicting stair design elements.

4.5.7. Shafts and Pits. The structural Model shall include all necessary shafts, pits, and openings, including necessary intelligence to produce accurate plans and building/wall sections depicting these design elements.

4.6. Mechanical. The mechanical systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing. Small diameter (less than 1-1/2" NPS) field-routed piping is not required in the model. Additional minimum Model requirements include:

4.6.1. HVAC. All necessary heating, ventilating, air-conditioning and specialty equipment, including air distribution ducts for supply, return, and ventilation and exhaust ducts, including control system, registers, diffusers, grills and hydronic baseboards with necessary intelligence to produce accurate plans, elevations, building/wall sections and schedules.

4.6.1.1. Mechanical Piping. All necessary piping and fixture layouts, and related equipment, including necessary intelligence to produce accurate plans, elevations, building/wall sections, and schedules.

4.6.2. Plumbing. All necessary plumbing piping and fixture layouts, floor and area drains, and related equipment, including necessary intelligence to produce accurate plans, elevations, building/wall sections, riser diagrams, and schedules.

4.6.3. Equipment Clearances. All HVAC and Plumbing equipment clearances shall be modeled for use in interference management and maintenance access requirements.

4.6.4. Elevator Equipment. The Model shall include the necessary equipment and control system, including necessary intelligence to produce accurate plans, sections and elevations depicting these design elements.

4.7. Electrical/Telecommunications. The electrical systems Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing. Small diameter (less than 1-1/2"Ø) field-routed conduit is not required in the model. Additional minimum Model requirements include:

4.7.1. Interior Electrical Power and Lighting. All necessary interior electrical components (i.e., lighting, receptacles, special and general purpose power receptacles, lighting fixtures, panelboards, cable trays and control systems), including necessary intelligence to produce accurate plans, details and schedules. Lighting and power built into furniture/equipment shall be modeled.

4.7.2. Special Electrical Systems. All necessary special electrical components (i.e., security, Mass Notification, Public Address, nurse call and other special occupancies, and control systems), including necessary intelligence to produce accurate plans, details and schedules.

4.7.3. Grounding Systems. Grounding Systems. All necessary grounding components (i.e., lightning protection systems, static grounding systems, communications grounding systems, bonding), including necessary intelligence to produce accurate plans, details and schedules.

4.7.4. Communications. All existing and new communications service controls and connections, both above ground and underground with necessary intelligence to produce accurate plans, details and schedules. Cable tray routing shall be modeled without detail of cable contents.

4.7.5. Exterior Building Lighting. All necessary exterior lighting with necessary intelligence to produce accurate plans, elevations and schedules. The exterior building lighting Model shall include all necessary lighting, relevant existing and proposed support utility lines and equipment required with necessary intelligence to produce accurate plans, details and schedules.

4.7.6. Equipment Clearances. The model shall incorporate and define all electrical and communications working spaces, clearances, and required access

4.8. Fire Protection. The fire protection system Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a quarter inch (1/4"=1'0") scaled drawing. Additional minimum Model requirements include:

4.8.1. Fire Protection System. All relevant fire protection components (i.e., branch piping, sprinkler heads, fittings, drains, pumps, tanks, sensors, control panels) with necessary intelligence to produce accurate plans, elevations, building/wall sections, riser diagrams, and schedules. All fire protection piping shall be modeled.

4.8.2. Fire Alarms. Fire alarm/mass notification devices and detection system shall be indicated with necessary intelligence to produce accurate plans depicting them.

4.9. Civil. The civil Model may vary in level of detail for individual elements, but at a minimum must include all features that would be included on a one inch (1"=100') scaled drawing. Additional minimum Model requirements include:

4.9.1. Terrain (DTM). All relevant site conditions and proposed grading, including necessary intelligence to produce accurate Project site topographical plans and cross sections.

4.9.2. Drainage. All existing and new drainage piping, including upgrades thereto, including necessary intelligence to produce accurate plans and profiles for the Project site.

4.9.3. Storm Water and Sanitary Sewers. All existing and new sewer structures and piping, including upgrades thereto, on the Project site with necessary connections to mains or other distribution points as appropriate, including necessary intelligence to produce accurate plans and profiles for the Project site.

4.9.4. Utilities. All necessary new utilities connections from the Project building(s) to the existing or newly-created utilities, and all existing above ground and underground utility conduits, including necessary intelligence to produce accurate plans and site-sections.

4.9.5. Roads and Parking. All necessary roadways and parking lots or parking structures, including necessary intelligence to produce accurate plans, profiles and cross-sections.

## **5.0 Section 5 - Ownership and Rights in Data**

5.1. Ownership. The Government has ownership of and rights at the date of Closeout Submittal to all CAD files, BIM Model, and Facility Data developed for the Project in accordance with FAR Part 27, clauses incorporated in Section 00 72 00, Contract Clauses and Special Contract Requirement 1.14 GOVERNMENT RE-USE OF DESIGN (Section 00 73 00). The Government may make use of this data following any deliverable.

## **6.0 Section 6 – Contractor Electives**

6.1. Applicable Criteria. If the Contractor elected to include one or more of the following features as an elective in its accepted contract proposal for additional credit during the source selection, as described in the proposal submission requirements and evaluation criteria, the following criteria are requirements, as applicable to those elective feature(s).

6.2. COBIE Compliance. The Model and Facility Data for the Project shall fulfill Construction Operations Building Information Exchange (COBIE) requirements as defined by the Whole Building Design Guide organization, including all requirements for the indexing and submission of Portable Document Format (PDF) and other appropriate file formats that would otherwise be printed and submitted in compliance with Project operations and maintenance handover requirements.

6.3. Project Scheduling using the Model. In the BIM Execution Plan and during the Preliminary BIM Execution Plan Review, provide an overview of the use of BIM in the development and support of the project construction schedule.

6.3.1. Submittal Requirements. During the Submittal stages, the Contractor shall deliver the construction schedule with information derived from the Model.

6.3.1.1. Construction Submittals – Over-The-Shoulder Progress Reviews. Periodic quality control meetings or construction progress review meetings shall include quality control reviews on the implementation and use of the Model for project scheduling.

6.4. Cost Estimating. In the BIM Execution Plan and during the Preliminary BIM Execution Plan Review, provide an overview of the use of BIM in the development and support of cost estimating requirements, or other applications such as cost analysis and estimate validation.

6.4.1. Submittal Requirements. During the Submittal stages, the Contractor shall deliver cost estimating information derived from the Model.

6.4.2. Project completion. At project completion, the Contractor shall provide an MII (Micro Computer Aided Cost Estimating System Generation II) Cost Estimate which follows the USACE Cost Engineering Military Work Breakdown System (WBS), a modified Uniformat, to at least the sub-systems level and uses quantity information supplied directly from BIM output to the maximum extent possible, though other "Gap" quantity information will be included as necessary for a complete and accurate cost estimate.

6.4.2.1. Sub system level extracted quantities from the BIM for use within the estimate shall be provided according to how detailed line items or tasks should be installed/built so that accurate costs can be developed and/or reflected. Therefore, when developing a BIM, the designer shall be cognizant of what tasks need to be separated appropriately at the beginning stages of model development, such as tasks done on the first floor versus the same task on higher floors that will be more labor intensive and therefore need to have a separate quantity and be priced differently. Tasks and their extracted quantities from the BIM shall be broken down by their location (proximity in the structure) as well as the complexity of its installation.

6.4.2.2. At all design stages it shall be understood that BIM output as described in this document will not generate all quantities that are necessary in order to develop a complete and accurate cost estimate of the project based on the design. An example of this would be plumbing that is less than 1.5" diameter and therefore not expected to be modeled due to granularity; this information is commonly referred to as The Gap. Quantities from The Gap and their associated costs shall be included in the final project actual cost estimates as well.

6.5. Other Analyses and Reports. Structural, energy and efficiency, EPACT 2005 & EISA 2007, lighting design, daylighting, electrical power, psychrometric processing, shading, programming, LEED, fire protection, code compliance, Life Cycle Cost, acoustic, plumbing.

## **7.0 Section 7 – BIM Project Execution Plan Template**

7.1. Contractors will utilize the latest version of the USACE BIM PROJECT EXECUTION PLAN (USACE PxP) Template to develop an acceptable Plan. The template can be downloaded from the CAD/BIM Technology Center website.







**ATTACHMENT G****DESIGN SUBMITTAL DIRECTORY AND SUBDIRECTORY FILE ARRANGEMENT**

Organize electronic design submittal files in a subdirectory/file structure in accordance with the following table. The Contractor may suggest a slightly different structure, subject to the discretion of the government.

**Design Submittal Directory and Subdirectory File Arrangement.**

Directory	Sub-Directory	Sub-Directory or Files	Files
Submittal/Package Name	Narratives	PDF file or files with updated design narrative for each applicable design discipline	
	Drawings	PDF (subdirectory)	Single PDF file with all applicable drawing sheets - bookmarked by sheet number and name
		BIM (subdirectory) See Attachment F.	BIM project folder (with files) per the USACE Workspace. Include an Excel drawing index file with each drawing sheet listed by sheet #, name and corresponding dgn file name (Final Design & Design Complete only)
	Design Analysis & Calculations	Individual PDF files containing design analysis and calculations for each discipline applicable to the submittal	
		PDF file with Fire Protection and Life Safety Code Review checklist	
	LEED	PDF file with updated Leed Check List	
		PDF file or files with LEED Templates for each point with applicable documentation included in each file.	
		LEED SUBMITTALS	
	Energy Analysis	PDF with baseline energy consumption analysis	
		PDF with actual building energy consumption analysis	
	Specifications	Single PDF file with table of contents and all applicable specifications sections.	
		Submittal Register (Final Design & Design Complete submittal only)	
	Design Quality Control	PDF file or files with DQC checklist(s) and/or statements	
	Building Rendering(s)	PDF file of rendering for each building type included in contract (Final Design & Design Complete).	

**SECTION 01 45 01.10  
QUALITY CONTROL SYSTEM (QCS)**

**1.0 GENERAL**

- 1.1. CORRESPONDENCE AND ELECTRONIC COMMUNICATIONS
- 1.2. QCS SOFTWARE
- 1.3. SYSTEM REQUIREMENTS
- 1.4. RELATED INFORMATION
- 1.5. CONTRACT DATABASE
- 1.6. DATABASE MAINTENANCE
- 1.7. IMPLEMENTATION
- 1.8. DATA SUBMISSION VIA COMPUTER DISKETTE OR CD-ROM
- 1.9. MONTHLY COORDINATION MEETING
- 1.10. NOTIFICATION OF NONCOMPLIANCE

## 1.0 GENERAL

The Government will use the Resident Management System for Windows (RMS) to assist in its monitoring and administration of this contract. The Contractor shall use the Government-furnished Construction Contractor Module of RMS, referred to as QCS, to record, maintain, and submit various information throughout the contract period. The Contractor module, user manuals, updates, and training information can be downloaded from the RMS web site. This joint Government-Contractor use of RMS and QCS will facilitate electronic exchange of information and overall management of the contract. QCS provides the means for the Contractor to input, track, and electronically share information with the Government in the following areas:

- Administration
- Finances
- Quality Control
- Submittal Monitoring
- Scheduling
- Import/Export of Data
- Request for Information
- Accident Reporting
- Safety Exposure Manhours

### 1.1. CORRESPONDENCE AND ELECTRONIC COMMUNICATIONS

For ease and speed of communications, both Government and Contractor will exchange correspondence and other documents in electronic format. Correspondence, pay requests and other documents comprising the official contract record shall also be provided in paper format, with signatures and dates where necessary. Paper documents will govern, in the event of discrepancy with the electronic version.

### 1.2. OTHER FACTORS

Particular attention is directed to Contract Clause, "Schedules for Construction Contracts", Contract Clause, "Payments", Section 01 32 01.00 10, PROJECT SCHEDULE, Section 01 33 00, SUBMITTAL PROCEDURES, and Section 01 45 04.00 10, CONTRACTOR QUALITY CONTROL, which have a direct relationship to the reporting to be accomplished through QCS. Also, there is no separate payment for establishing and maintaining the QCS database; all costs associated therewith shall be included in the contract pricing for the work.

### 1.3. QCS SOFTWARE

QCS is a Windows-based program that can be run on a stand-alone personal computer or on a network. The Government will make available the QCS software to the Contractor after award of the construction contract. Prior to the Pre-Construction Conference, the Contractor shall be responsible to download, install and use the latest version of the QCS software from the Government's RMS Internet Website. Upon specific justification and request by the Contractor, the Government can provide QCS on CD-ROM. Any program updates of QCS will be made available to the Contractor via the Government RMS Website as they become available.

### 1.4. SYSTEM REQUIREMENTS

The following listed hardware and software is the minimum system configuration that the Contractor shall have to run QCS:

#### (a) Hardware

- IBM-compatible PC with 1000 MHz Pentium or higher processor
- 256 MB RAM for workstation / 512+ MB RAM for server
- 1 GB hard drive disk space for sole use by the QCS system
- Compact disk (CD) Reader, 8x speed or higher
- SVGA or higher resolution monitor (1024 x 768, 256 colors)
- Mouse or other pointing device
- Windows compatible printer (Laser printer must have 4+ MB of RAM)
- Connection to the Internet, minimum 56K BPS

(b) Software

- MS Windows 2000 or higher
- MS Word 2000 or newer
- Latest version of : Netscape Navigator, Microsoft Internet Explorer, or other browser that supports HTML 4.0 or higher
- Electronic mail (E-mail), MAPI compatible
- Virus protection software that is regularly upgraded with all issued manufacturer's updates

1.5. RELATED INFORMATION

1.5.1. QCS USER GUIDE

After contract award, the Contractor shall download instructions for the installation and use of QCS from the Government RMS Internet Website. In case of justifiable difficulties, the Government will provide the Contractor with a CD-ROM containing these instructions.

1.5.2. CONTRACTOR QUALITY CONTROL (CQC) TRAINING

The use of QCS will be discussed with the Contractor's QC System Manager during the mandatory CQC Training class.

1.6. CONTRACT DATABASE

Prior to the pre-construction conference, the Government will provide the Contractor with basic contract award data to use for QCS. The Government will provide data updates to the Contractor as needed, generally by using the government's SFTP repository built into QCS import/export function. These updates will generally consist of submittal reviews, correspondence status, QA comments, and other administrative and QA data.

1.7. DATABASE MAINTENANCE

The Contractor shall establish, maintain, and update data for the contract in the QCS database throughout the duration of the contract. The Contractor shall establish and maintain the QCS database at the Contractor's site office. Data updates to the Government, e.g., daily reports, submittals, RFI's, schedule updates, payment requests, etc. shall be submitted using the government's SFTP repository built into QCS export function. If permitted by the Contracting Officer, email or CD-ROM may be used instead (see Paragraph DATA SUBMISSION VIA CD-ROM). The QCS database typically shall include current data on the following items:

1.7.1. ADMINISTRATION

1.7.1.1. Contractor Information

The database shall contain the Contractor's name, address, telephone numbers, management staff, and other required items. Within 14 calendar days of receipt of QCS software from the Government, the Contractor shall deliver Contractor administrative data in electronic format.

1.7.1.2. Subcontractor Information

The database shall contain the name, trade, address, phone numbers, and other required information for all subcontractors. A subcontractor must be listed separately for each trade to be performed. Each subcontractor/trade shall be assigned a unique Responsibility Code, provided in QCS. Within 14 calendar days of receipt of QCS software from the Government, the Contractor shall deliver subcontractor administrative data in electronic format.

1.7.1.3. Correspondence

All Contractor correspondence to the Government shall be identified with a serial number. Correspondence initiated by the Contractor's site office shall be prefixed with "S". Letters initiated by the Contractor's home (main)

office shall be prefixed with "H". Letters shall be numbered starting from 0001. (e.g., H-0001 or S-0001). The Government's letters to the Contractor will be prefixed with "C".

All Requests For Information (RFI) shall be exchanged using the Built-in RFI generator and tracker in QCS.

#### 1.7.1.4. Equipment

The Contractor's QCS database shall contain a current list of equipment planned for use or being used on the jobsite, including the most recent and planned equipment inspection dates.

#### 1.7.1.5. Management Reporting

QCS includes a number of reports that Contractor management can use to track the status of the project. The value of these reports is reflective of the quality of the data input, and is maintained in the various sections of QCS. Among these reports are: Progress Payment Request worksheet, QA/QC comments, Submittal Register Status, Three-Phase Inspection checklists.

### 1.7.2. FINANCES

#### 1.7.2.1. Pay Activity Data

The QCS database shall include a list of pay activities that the Contractor shall develop in conjunction with the design and construction schedule. The sum of all pay activities shall be equal to the total contract amount, including modifications. Pay activities shall be grouped by Contract Line Item Number (CLIN), and the sum of the activities shall equal the amount of each CLIN. The total of all CLINs equals the Contract Amount.

#### 1.7.2.2. Payment Requests

All progress payment requests shall be prepared using QCS. The Contractor shall complete the payment request worksheet prompt payment certification, and payment invoice in QCS. The work completed under the contract, measured as percent or as specific quantities, shall be updated at least monthly. After the update, the Contractor shall generate a payment request report using QCS. The Contractor shall submit the payment request, prompt payment certification, and payment invoice with supporting data by using the government's SFTP repository built into QCS export function. If permitted by the Contracting Officer, E-mail or a CD-ROM may be used. A signed paper copy of the approved payment request is also required, which shall govern in the event of discrepancy with the electronic version.

#### 1.7.3. Quality Control (QC)

QCS provides a means to track implementation of the 3-phase QC Control System, prepare daily reports, identify and track deficiencies, document progress of work, and support other contractor QC requirements. The Contractor shall maintain this data on a daily basis. Entered data will automatically output to the QCS generated daily report. The Contractor shall provide the Government a Contractor Quality Control (CQC) Plan within the time required in Section 01 45 04.00 10, CONTRACTOR QUALITY CONTROL. Within seven calendar days of Government acceptance, the Contractor shall submit a QCS update reflecting the information contained in the accepted CQC Plan: schedule, pay activities, features of work, submittal register, QC requirements, and equipment list.

#### 1.7.3.1. Daily Contractor Quality Control (CQC) Reports

QCS includes the means to produce the Daily CQC Report. The Contractor may use other formats to record basic QC data. However, the Daily CQC Report generated by QCS shall be the Contractor's official report. Data from any supplemental reports by the Contractor shall be summarized and consolidated onto the QCS-generated Daily CQC Report. Daily CQC Reports shall be submitted as required by Section 01 45 04.00 10, CONTRACTOR QUALITY CONTROL. Reports shall be submitted electronically to the Government within 24 hours after the date covered by the report. The Contractor shall also provide the Government a signed, printed copy of the daily CQC report.

#### 1.7.3.2. Deficiency Tracking

The Contractor shall use QCS to track deficiencies. Deficiencies identified by the Contractor will be numerically tracked using QC punch list items. The Contractor shall maintain a current log of its QC punch list items in the QCS database. The Government will log the deficiencies it has identified using its QA punch list items. The Government's QA punch list items will be included in its export file to the Contractor. The Contractor shall regularly update the correction status of both QC and QA punch list items.

#### 1.7.3.3. QC Requirements

The Contractor shall develop and maintain a complete list of QC testing and required structural and life safety special inspections required by the International Code Council (ICC), transferred and installed property, and user training requirements in QCS. The Contractor shall update all data on these QC requirements as work progresses, and shall promptly provide this information to the Government via QCS.

#### 1.7.3.4. Three-Phase Control Meetings

The Contractor shall maintain scheduled and actual dates and times of preparatory and initial control meetings in QCS.

#### 1.7.3.5. Labor and Equipment Hours

The Contractor shall log labor and equipment exposure hours on a daily basis. This data will be rolled up into a monthly exposure report.

#### 1.7.3.6. Accident/Safety Tracking Reporting

The Government will issue safety comments, directions, or guidance whenever safety deficiencies are observed. The Government's safety comments will be included in its export file to the Contractor. The Contractor shall regularly update the correction status of the safety comments. In addition, the Contractor shall utilize QCS to advise the Government of any accidents occurring on the jobsite. This supplemental entry is not to be considered as a substitute for completion of mandatory notification and reports, e.g., ENG Form 3394 and OSHA Form 300.

#### 1.7.3.7. Features of Work

The Contractor shall include a complete list of the features of work in the QCS database. A feature of work may be associated with multiple pay activities. However, each pay activity (see subparagraph "Pay Activity Data" of paragraph "Finances") will only be linked to a single feature of work.

#### 1.7.3.8. Hazard Analysis

The Contractor shall use QCS to develop a hazard analysis for each feature of work included in its CQC Plan. The hazard analysis shall address any hazards, or potential hazards, that may be associated with the work

#### 1.7.4. Submittal Management

The Government will provide the submittal register form, ENG Form 4288, SUBMITTAL REGISTER, in electronic format. The Contractor and Designer of Record (DOR) shall develop and maintain a complete list of all submittals, including completion of all data columns and shall manage all submittals. Dates on which submittals are received and returned by the Government will be included in its export file to the Contractor. The Contractor shall use QCS to track and transmit all submittals. ENG Form 4025, submittal transmittal form, and the submittal register update, ENG Form 4288, shall be produced using QCS. QCS and RMS will be used to update, store and exchange submittal registers and transmittals, but will not be used for storage of actual submittals.

#### 1.7.5. Schedule

The Contractor shall develop a design and construction schedule consisting of pay activities, in accordance with Section 01 32 01.00 10, PROJECT SCHEDULE, as applicable. This schedule shall be input and maintained in the QCS database either manually or by using the Standard Data Exchange Format (SDEF) (see Section 01 32 01.00 10 PROJECT SCHEDULE). The updated schedule data shall be included with each pay request submitted by the Contractor.

#### 1.7.5.1. Import/Export of Data

QCS includes the ability to export Contractor data to the Government and to import submittal register and other Government-provided data from RMS, and schedule data using SDEF.

#### 1.8. IMPLEMENTATION

Contractor use of QCS as described in the preceding paragraphs is mandatory. The Contractor shall ensure that sufficient resources are available to maintain its QCS database, and to provide the Government with regular database updates. QCS shall be an integral part of the Contractor's management of quality control.

#### 1.9. DATA SUBMISSION VIA COMPUTER DISKETTE OR CD-ROM

The Government-preferred method for Contractor's submission of QCS data is by using the government's SFTP repository built into QCS export function.. Other data should be submitted using E-mail with file attachment(s). For locations where this is not feasible, the Contracting Officer may permit use of CD-ROM for data transfer. Data on CDs shall be exported using the QCS built-in export function. If used, CD-ROMs will be submitted in accordance with the following:

##### 1.9.1. File Medium

The Contractor shall submit required data on CD-ROMs. They shall conform to industry standards used in the United States. All data shall be provided in English.

##### 1.9.2. Disk Or Cd-Rom Labels

The Contractor shall affix a permanent exterior label to each diskette and CD-ROM submitted. The label shall indicate in English, the QCS file name, full contract number, contract name, project location, data date, name and telephone number of person responsible for the data.

##### 1.9.3. File Names

The files will be automatically named by the QCS software. The naming convention established by the QCS software shall not be altered in any way by the Contractor.

#### 1.10. MONTHLY COORDINATION MEETING

The Contractor shall update the QCS database each workday. At least monthly, the Contractor shall generate and submit an export file to the Government with schedule update and progress payment request. As required in Contract Clause "Payments", at least one week prior to submittal, the Contractor shall meet with the Government representative to review the planned progress payment data submission for errors and omissions.

The Contractor shall make all required corrections prior to Government acceptance of the export file and progress payment request. Payment requests accompanied by incomplete or incorrect data submittals will be returned. The Government will not process progress payments until an acceptable QCS export file is received.

#### 1.11. NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the requirements of this specification. The Contractor shall take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, shall be deemed sufficient for the purpose of notification.

End of Section 01 45 01.10



**SECTION 01 45 04.00 10  
CONTRACTOR QUALITY CONTROL**

**1.0 GENERAL**

1.1. REFERENCES

1.2. PAYMENT

**2.0 PRODUCTS (NOT APPLICABLE)**

**3.0 EXECUTION**

3.1. GENERAL REQUIREMENTS

3.2. QUALITY CONTROL PLAN

3.3. COORDINATION MEETING

3.4. QUALITY CONTROL ORGANIZATION

3.5. SUBMITTALS AND DELIVERABLES

3.6. CONTROL

3.7. TESTS

3.8. COMPLETION INSPECTION

3.9. DOCUMENTATION

3.10. NOTIFICATION OF NONCOMPLIANCE

## **1.0 GENERAL**

### **1.1. REFERENCES**

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Refer to the latest edition, as of the date of the contract solicitation.

- ASTM INTERNATIONAL (ASTM)
- ASTM D 3740 Minimum Requirements for Agencies  
Engaged in the Testing and/or Inspection  
of Soil and Rock as Used in Engineering  
Design and Construction
- ASTM E 329 Agencies Engaged in the Testing  
and/or Inspection of Materials Used in  
Construction
- U.S. ARMY CORPS OF ENGINEERS (USACE)  
ER 1110-1-12 Quality Management

### **1.2. PAYMENT**

There will be no separate payment for providing and maintaining an effective Quality Control program. Include all costs associated therewith in the applicable unit prices or lump-sum prices contained in the Contract Line Item Schedule.

## **2.0 PRODUCTS (Not Applicable)**

## **3.0 EXECUTION**

### **3.1. GENERAL REQUIREMENTS**

The Contractor is responsible for quality control and shall establish and maintain an effective quality control system in compliance with the Contract Clause titled "Inspection of Construction." The quality control system shall consist of plans, procedures, and organization necessary to produce an end product, which complies with the contract requirements. The system shall cover all design and construction operations, both onsite and offsite, and shall be keyed to the proposed design and construction sequence. The site project superintendent is responsible for the quality of work on the job and is subject to removal by the Contracting Officer for non-compliance with the quality requirements specified in the contract. The site project superintendent in this context shall be the highest level manager responsible for the overall construction activities at the site, including quality and production. The site project superintendent shall maintain a physical presence at the site at all times, except as otherwise acceptable to the Contracting Officer, and shall be responsible for all construction and construction related activities at the site.

### **3.2. QUALITY CONTROL PLAN**

Furnish for Government review, not later than 30 days after receipt of notice to proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements of the Contract Clause titled "Inspection of Construction." The plan shall identify personnel, procedures, control, instructions, tests, records, and forms to be used. The Government will consider an interim plan for the first 30 days of operation. Design and construction may begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of work to be started. The Government will not permit work outside of the features of work included in an accepted interim plan to begin until acceptance of a CQC Plan or another interim plan containing the additional features of work to be started. Where the applicable Code issued by the International Code Council calls for an inspection by the Building Official, the Contractor shall include the inspections in the Quality Control Plan and shall perform the inspections. The Designer of Record shall develop a program for any special inspections required by the applicable International Codes and the Contractor shall perform these inspections, using qualified inspectors. Include the special inspection plan in the QC Plan.

### 3.2.1. Content of the CQC Plan

The CQC Plan shall include, as a minimum, the following to cover all design and construction operations, both onsite and offsite, including work by subcontractors, fabricators, suppliers, and purchasing agents subcontractors, designers of record, consultants, architect/engineers (AE), fabricators, suppliers, and purchasing agents:

3.2.1.1. A description of the quality control organization. Include a chart showing lines of authority and an acknowledgment that the CQC staff shall implement the three phase control system for all aspects of the work specified. A CQC System Manager shall report to the project superintendent or someone higher in the contractor's organization.

3.2.1.2. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function. Also include those responsible for performing and documenting the inspections required by the International Codes and the special inspection program developed by the designer of record.

3.2.1.3. A copy of the letter to the CQC System Manager, signed by an authorized official of the firm, which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the contract. The CQC System Manager shall issue letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities. Furnish copies of these letters.

3.2.1.4. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, offsite fabricators, suppliers, and purchasing agents subcontractors, designers of record, consultants, architect engineers (AE), offsite fabricators, suppliers, and purchasing agents. These procedures shall be in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.

3.2.1.5. Control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. Use only Government approved Laboratory facilities.

3.2.1.6. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.

3.2.1.7. Procedures for tracking design and construction deficiencies from identification through acceptable corrective action. These procedures shall establish verification that identified deficiencies have been corrected.

3.2.1.8. Reporting procedures, including proposed reporting formats.

3.2.1.9. A list of the definable features of work. A definable feature of work is a task, which is separate and distinct from other tasks, has separate control requirements, and may be identified by different trades or disciplines, or it may be work by the same trade in a different environment. Although each section of the specifications may generally be considered as a definable feature of work, there are frequently more than one definable feature under a particular section. This list will be agreed upon during the coordination meeting.

3.2.1.10. A list of all inspections required by the International Codes and the special inspection program required by the code and this contract.

### 3.2.2. Additional Requirements for Design Quality Control (DQC) Plan

The following additional requirements apply to the Design Quality Control (DQC) plan:

3.2.2.1. The Contractor's QCP Plan shall provide and maintain a Design Quality Control (DQC) Plan as an effective quality control program which will assure that all services required by this design-build contract are performed and provided in a manner that meets professional architectural and engineering quality standards. As a minimum, competent, independent reviewers identified in the DQC Plan shall review all documents. Use personnel who were not involved in the design effort to produce the design to perform the independent technical review (ITR). The ITR is intended as a quality control check of the design. Include, at least, but not necessarily limited to, a review of the contract requirements (the accepted contract or task order proposal and amended RFP), the basis of design, design calculations, the design configuration management documentation and check the design documents for

errors, omissions, and for coordination and design integration. The ITR team is not required to examine, compare or comment concerning alternate design solutions but should concentrate on ensuring that the design meets the contract requirements. Correct errors and deficiencies in the design documents prior to submitting them to the Government.

3.2.2.2. Include in the DQC Plan the discipline-specific checklists to be used during the design and quality control of each submittal. Submit these completed checklists at each design phase as part of the project documentation.

3.2.2.3. A Design Quality Control Manager, who has the responsibility of being cognizant of and assuring that all documents on the project have been coordinated, shall implement the DQC Plan. This individual shall be a person who has verifiable engineering or architectural design experience and is a registered professional engineer or architect. Notify the Government, in writing, of the name of the individual, and the name of an alternate person assigned to the position.

### 3.2.3. Acceptance of Plan

Government acceptance of the Contractor's plan is required prior to the start of design and construction. Acceptance is conditional and will be predicated on satisfactory performance during the design and construction. The Government reserves the right to require the Contractor to make changes in his CQC Plan and operations including removal of personnel, as necessary, to obtain the quality specified.

### 3.2.4. Notification of Changes

After acceptance of the CQC Plan, notify the Government in writing of any proposed change. Proposed changes are subject to Government acceptance.

## 3.3. COORDINATION MEETING

After the Postaward Conference, before start of design or construction, and prior to acceptance by the Government of the CQC Plan, the Contractor and the Government shall meet and discuss the Contractor's quality control system. Submit the CQC Plan for review a minimum of 7 calendar days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details shall be developed, including the forms for recording the CQC operations, design activities, control activities, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's Management and control with the Government's Quality Assurance. The Government will prepare minutes of the meeting for signature by both parties. . The minutes shall become a part of the contract file. There may be occasions when either party will call for subsequent conferences to reconfirm mutual understandings and/or address deficiencies in the CQC system or procedures which may require corrective action by the Contractor.

## 3.4. QUALITY CONTROL ORGANIZATION

### 3.4.1. Personnel Requirements

The requirements for the CQC organization are a CQC System Manager, a Design Quality Manager, and sufficient number of additional qualified personnel to ensure contract compliance. The CQC organization shall also include personnel identified in the technical provisions as requiring specialized skills to assure the required work is being performed properly. The Contractor's CQC staff shall maintain a presence at the site at all times during progress of the work and have complete authority and responsibility to take any action necessary to ensure contract compliance. The CQC staff shall be subject to acceptance by the Contracting Officer. Provide adequate office space, filing systems and other resources as necessary to maintain an effective and fully functional CQC organization. Promptly furnish complete records of all letters, material submittals, shop drawing submittals, schedules and all other project documentation to the CQC organization. The CQC organization shall be responsible to maintain these documents and records at the site at all times, except as otherwise acceptable to the Contracting Officer.

### 3.4.2. CQC System Manager

Identify as CQC System Manager an individual within the onsite work organization who shall be responsible for overall management of CQC and have the authority to act in all CQC matters for the Contractor. The CQC System

Manager shall be a graduate engineer, graduate architect, or a BA/BS graduate of an ACCE accredited construction management college program. The CQC system Manager may alternately be an engineering technician with at least 2 years of college and an ICC certification as a Commercial Building Inspector (Residential Building Inspector certification will be required for Military Family Housing projects). In addition, the CQC system manager shall have a minimum of 5 years construction experience on construction similar to this contract. The CQC System Manager shall be on the site at all times during construction and shall be employed by the prime Contractor. Assign the CQC System Manager no other duties (except may also serve as Safety and Health Officer, if qualified and if allowed by Section 00 73 00). Identify an alternate for the CQC System Manager in the plan to serve in the event of the System Manager's absence. The requirements for the alternate shall be the same as for the designated CQC System Manager but the alternate may have other duties in addition to serving in a temporary capacity as the acting QC manager.

#### 3.4.3. CQC Personnel

3.4.3.1. In addition to CQC personnel specified elsewhere in the contract provide specialized CQC personnel to assist the CQC System Manager in accordance with paragraph titled Area Qualifications.

3.4.3.2. These individuals may be employees of the prime or subcontractor; be responsible to the CQC System Manager; **are not intended to be full time, but must be physically present at the construction site during work on their areas of responsibility**; have the necessary education and/or experience in accordance with the experience matrix listed herein. These individuals may perform other duties but must be allowed sufficient time to perform their assigned quality control duties as described in the Quality Control Plan. **One person may cover more than one area, provided that they are qualified to perform QC activities for the designated areas below and provided that they have adequate time to perform their duties:**

#### 3.4.4. Experience Matrix

##### 3.4.4.1. Area Qualifications

3.4.4.1.1. Civil - Graduate Civil Engineer or (BA/BS) graduate in construction management with 4 years experience in the type of work being performed on this project or engineering technician with 5 yrs related experience.

3.4.4.1.2. Mechanical - Graduate Mechanical Engineer or (BA/BS) graduate in construction management with 4 yrs related experience or engineering technician with an ICC certification as a Commercial Mechanical Inspector with 5 yrs related experience.

3.4.4.1.3. Electrical - Graduate Electrical Engineer or (BA/BS) graduate in construction management with 4 yrs related experience or engineering technician with an ICC certification as a Commercial Electrical Inspector with 5 yrs related experience.

3.4.4.1.4. Structural - Graduate Structural Engineer or (BA/BS) graduate in construction management with 4 yrs related experience or person with an ICC certification as a Reinforced Concrete Special Inspector and Structural Steel and Bolting Special Inspector (as applicable to the type of construction involved) with 5 yrs related experience.

3.4.4.1.5. Plumbing - Graduate Mechanical Engineer or (BA/BS) graduate in construction management with 4 yrs related experience, or person with an ICC certification as a Commercial Plumbing Inspector with 5 yrs related experience.

3.4.4.1.6. Concrete, Pavements and Soils Materials Technician (present while performing tests) with 2 yrs experience for the appropriate area

3.4.4.1.7. Testing, Adjusting and Balancing Specialist must be a member (TAB) Personnel of AABC or an experienced technician of the firm certified by the NEBB (present while testing, adjusting, balancing).

3.4.4.1.8. Design Quality Control Manager Registered Architect or Professional Engineer (not required on the construction site)

3.4.4.1.9. Registered Fire Protection Engineer with 4 years related experience or engineering technician with 5 yrs related experience (but see requirements for Fire Protection Engineer of Record to witness final testing in Section 01 10 00, paragraph 5.10, Fire Protection).

3.4.4.1.10. QC personnel assigned to the installation of the telecommunication system or any of its components shall be Building Industry Consulting Services International (BICSI) Registered Cabling Installers, Technician Level. Submit documentation of current BICSI certification. In lieu of BICSI certification, QC personnel shall have a minimum of 5 years experience in the installation of the specified copper and fiber optic cable and components. They shall have factory or factory approved certification from each equipment manufacturer indicating that they are qualified to install and test the provided products. QC personnel shall witness and certify the testing of telecommunications cabling and equipment.

#### 3.4.5. Additional Requirement

In addition to the above experience and/or education requirements the CQC System Manager shall have completed the course entitled "Construction Quality Management for Contractors". This course is periodically offered at Carolina AGC AT (704-372-1450 X 5248 OR 5254. Inquire of the District or Division sponsoring the course for fees and other expenses involved, if any, for attendance at this course.

#### 3.4.6. Organizational Changes

When it is necessary to make changes to the CQC staff, the Contractor shall revise the CQC Plan to reflect the changes and submit the changes to the Contracting Officer for acceptance.

### 3.5. SUBMITTALS AND DELIVERABLES

Make submittals as specified in Section 01 33 00 **SUBMITTAL PROCEDURES**. The CQC organization shall certify that all submittals and deliverables are in compliance with the contract requirements.

### 3.6. CONTROL

Contractor Quality Control is the means by which the Contractor ensures that the construction, to include that of subcontractors and suppliers, complies with the requirements of the contract. The CQC organization shall conduct at least three phases of control for each definable feature of the construction work as follows:

#### 3.6.1. Preparatory Phase

Perform this phase prior to beginning work on each definable feature of work, after all required plans/documents/materials are approved/accepted, and after copies are at the work site. This phase shall include:

3.6.1.1. A review of each paragraph of applicable specifications, reference codes, and standards. Make a copy of those sections of referenced codes and standards applicable to that portion of the work to be accomplished in the field at the preparatory inspection. Maintain these copies in the field, available for use by Government personnel until final acceptance of the work.

3.6.1.2. A review of the contract drawings.

3.6.1.3. A check to assure that all materials and/or equipment have been tested, submitted, and approved.

3.6.1.4. Review of provisions that have been made to provide required control inspection and testing.

3.6.1.5. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the contract.

3.6.1.6. A physical examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored.

3.6.1.7. A review of the appropriate activity hazard analysis to assure safety requirements are met.

3.6.1.8. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that feature of work.

3.6.1.9. A check to ensure that the portion of the plan for the work to be performed has been accepted by the Contracting Officer.

3.6.1.10. Discussion of the initial control phase.

3.6.1.11. Notify the Government at least 24 hours in advance of beginning the preparatory control phase. This phase shall include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. Document the results of the preparatory phase actions by separate minutes prepared by the CQC System Manager and attached to the daily CQC report. The Contractor shall instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

### 3.6.2. Initial Phase

Accomplish this phase at the beginning of a definable feature of work. Include the following actions:

3.6.2.1. Check work to ensure that it is in full compliance with contract requirements. Review minutes of the preparatory meeting.

3.6.2.2. Verify adequacy of controls to ensure full contract compliance. Verify required control inspection and testing.

3.6.2.3. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.

3.6.2.4. Resolve all differences.

3.6.2.5. Check safety to include compliance with and upgrading of the Accident Prevention plan and activity hazard analysis. Review the activity analysis with each worker.

3.6.2.6. Notify the Government at least 24 hours in advance of beginning the initial phase. The CQC System Manager shall prepare and attach to the daily CQC report separate minutes of this phase. Indicate exact location of initial phase for future reference and comparison with follow-up phases.

3.6.2.7. Repeat the initial phase any time acceptable specified quality standards are not being met.

### 3.6.3. Follow-up Phase

Perform daily checks to assure control activities, including control testing, are providing continued compliance with contract requirements, until completion of the particular feature of work. The checks shall be made a matter of record in the CQC documentation. Conduct final follow-up checks and correct deficiencies prior to the start of additional features of work which may be affected by the deficient work. Do not build upon nor conceal non-conforming work.

### 3.6.4. Additional Preparatory and Initial Phases

Conduct additional preparatory and initial phases on the same definable features of work if: the quality of on-going work is unacceptable; if there are changes in the applicable CQC staff, onsite production supervision or work crew; if work on a definable feature is resumed after a substantial period of inactivity; or if other problems develop.

## 3.7. TESTS

### 3.7.1. Testing Procedure

Perform specified or required tests to verify that control measures are adequate to provide a product which conforms to contract requirements and project design documents. Upon request, furnish to the Government

duplicate samples of test specimens for possible testing by the Government. Testing includes operation and/or acceptance tests when specified. The Contractor shall procure the services of a Corps of Engineers approved testing laboratory, or establish an approved testing laboratory at the project site. The Contractor may elect to use a laboratory certified and accredited by the Concrete and cement Reference Laboratory (CCRL) or by AASHTO Materials Reference Laboratory (AMRL) for testing procedures that those organizations certify. The Contractor shall perform the following activities and record and provide the following data:

3.7.1.1. Verify that testing procedures comply with contract requirements and project design documents.

3.7.1.2. Verify that facilities and testing equipment are available and comply with testing standards.

3.7.1.3. Check test instrument calibration data against certified standards.

3.7.1.4. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.

3.7.1.5. Include results of all tests taken, both passing and failing tests, recorded on the CQC report for the date taken. Include specification paragraph reference, location where tests were taken, and the sequential control number identifying the test. If approved by the Contracting Officer, actual test reports may be submitted later with a reference to the test number and date taken. Provide an information copy of tests performed by an offsite or commercial test facility directly to the Contracting Officer. Failure to submit timely test reports as stated may result in nonpayment for related work performed and disapproval of the test facility for this contract.

### 3.7.2. Testing Laboratories

#### 3.7.2.1. Capability Check

The Government reserves the right to check laboratory equipment in the proposed laboratory for compliance with the standards set forth in the contract specifications and to check the laboratory technician's testing procedures and techniques. Laboratories utilized for testing soils, concrete, asphalt, and steel shall meet criteria detailed in ASTM D 3740 and ASTM E 329.

#### 3.7.2.2. Capability Recheck

If the selected laboratory fails the capability check, the Government will assess the Contractor a charge of \$1,375 to reimburse the Government for each succeeding recheck of the laboratory or the checking of a subsequently selected laboratory. Such costs will be deducted from the contract amount due the Contractor.

#### 3.7.3. Onsite Laboratory

The Government reserves the right to utilize the Contractor's control testing laboratory and equipment to make assurance tests, and to check the Contractor's testing procedures, techniques, and test results at no additional cost to the Government.

#### 3.7.4. Furnishing or Transportation of Samples for Government Quality Assurance Testing

The Contractor is responsible for costs incidental to the transportation of samples or materials. Deliver samples of materials for test verification and acceptance testing by the Government to the Corps of Engineers Laboratory, f.o.b., at the following address:

- For delivery by mail:  
US Army Engineer District, Savannah  
Environmental & Materials Unit  
200 North Cobb Parkway, Building 400, Suite 404  
Marietta, GA 30062
- For other deliveries:  
N/A



N/A

N/A

N/A

The area or resident office will coordinate, exact delivery location, and dates for each specific test.

### 3.8. COMPLETION INSPECTION

#### 3.8.1. Punch-Out Inspection

Near the end of the work, or any increment of the work established by a time stated in the SPECIAL CONTRACT REQUIREMENTS Clause, "Commencement, Prosecution, and Completion of Work", or by the specifications, the CQC Manager shall conduct an inspection of the work. Prepare a punch list of items which do not conform to the approved drawings and specifications and include in the CQC documentation, as required by paragraph DOCUMENTATION. The list of deficiencies shall include the estimated date by which the deficiencies will be corrected. The CQC System Manager or staff shall make a second inspection to ascertain that all deficiencies have been corrected. Once this is accomplished, the Contractor shall notify the Government that the facility is ready for the Government Pre-Final inspection.

#### 3.8.2. Pre-Final Inspection

As soon as practicable after the notification above, the Government will perform the pre-final inspection to verify that the facility is complete and ready to be occupied. A Government Pre-Final Punch List may be developed as a result of this inspection. The Contractor's CQC System Manager shall ensure that all items on this list have been corrected before notifying the Government, so that a Final inspection with the customer can be scheduled. Correct any items noted on the Pre-Final inspection in a timely manner. Accomplish these inspections and any deficiency corrections required by this paragraph within the time slated for completion of the entire work or any particular increment of the work if the project is divided into increments by separate completion dates.

#### 3.8.3. Final Acceptance Inspection

The Contractor's Quality Control Inspection personnel, plus the superintendent or other primary management person, and the Contracting Officer's Representative shall attend the final acceptance inspection. Additional Government personnel including, but not limited to, those from Base/Post Civil Facility Engineer user groups and major commands may also attend. The Government will formally schedule the final acceptance inspection based upon results of the Pre-Final inspection. Provide notice to the Government at least 14 days prior to the final acceptance inspection and include the Contractor's assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the contract, will be complete and acceptable by the date scheduled for the final acceptance inspection. Failure of the Contractor to have all contract work acceptably complete for this inspection will be cause for the Contracting Officer to bill the Contractor for the Government's additional inspection cost in accordance with the contract clause titled "Inspection of Construction".

### 3.9. DOCUMENTATION

3.9.1. Maintain current records providing factual evidence that required quality control activities and/or tests have been performed. These records shall include the work of subcontractors and suppliers using government-provided software, QCS (see Section 01 45 01.10). The report includes, as a minimum, the following information:

3.9.1.1. Contractor/subcontractor and their area of responsibility.

3.9.1.2. Operating plant/equipment with hours worked, idle, or down for repair.

3.9.1.3. Work performed each day, giving location, description, and by whom. When Network Analysis (NAS) is used, identify each phase of work performed each day by NAS activity number.

- 3.9.1.4. Test and/or control activities performed with results and references to specifications/drawings requirements. Identify the applicable control phase (Preparatory, Initial, Follow-up). List deficiencies noted, along with corrective action.
- 3.9.1.5. Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications/drawings requirements.
- 3.9.1.6. Submittals and deliverables reviewed, with contract reference, by whom, and action taken.
- 3.9.1.7. Offsite surveillance activities, including actions taken.
- 3.9.1.8. Job safety evaluations stating what was checked, results, and instructions or corrective actions.
- 3.9.1.9. Instructions given/received and conflicts in plans and/or specifications.
- 3.9.1.10. Provide documentation of design quality control activities. For independent design reviews, provide, as a minimum, identity of the ITR team, the ITR review comments, responses and the record of resolution of the comments.
- 3.9.2. Contractor's verification statement.

These records shall indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. These records shall cover both conforming and deficient features and shall include a statement that equipment and materials incorporated in the work and workmanship comply with the contract. Furnish the original and one copy of these records in report form to the Government daily within 24 hours after the date covered by the report, except that reports need not be submitted for days on which no work is performed. As a minimum, submit one report for every 7 days of no work and on the last day of a no work period. Account for all calendar days throughout the life of the contract. The first report following a day of no work shall be for that day only. The CQC System Manager shall sign and date reports. The report shall include copies of test reports and copies of reports prepared by all subordinate quality control personnel. The Contractor may submit these forms electronically, in lieu of hard copy.

### 3.10. NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the foregoing requirements. The Contractor shall take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, shall be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders shall be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

End of Section 01 45 04.00 10

**SECTION 01 50 02  
TEMPORARY CONSTRUCTION FACILITIES**

**1.0 OVERVIEW**

- 1.1. GENERAL REQUIREMENTS
- 1.2. AVAILABILITY AND USE OF UTILITY SERVICES
- 1.3. BULLETIN BOARD, PROJECT SIGN, AND PROJECT SAFETY SIGN
- 1.4. PROTECTION AND MAINTENANCE OF TRAFFIC
- 1.5. MAINTENANCE OF CONSTRUCTION SITE
- 1.6. GOVERNMENT FIELD OFFICE

## 1.0 OVERVIEW

### 1.1. GENERAL REQUIREMENTS

#### 1.1.1. Site Plan

Prepare a site plan indicating the proposed location and dimensions of any area to be fenced and used by the Contractor, the number of trailers to be used, avenues of ingress/egress to the fenced area and details of the fence installation. Identify any areas which may have to be graveled to prevent the tracking of mud. Also indicate if the use of a supplemental or other staging area is desired.

### 1.2. AVAILABILITY AND USE OF UTILITY SERVICES

1.2.1. See Section 00 72 00, Contract Clauses and Section 00 73 00, Special Contract Requirements, for Utility Availability requirements.

#### 1.2.2. Sanitation

Provide and maintain within the construction area minimum field-type sanitary facilities approved by the Contracting Officer. Government toilet facilities will not be available to Contractor's personnel.

#### 1.2.3. Telephone

Make arrangements and pay all costs for desired telephone facilities.

### 1.3. BULLETIN BOARD, PROJECT SIGN, AND PROJECT SAFETY SIGN

#### 1.3.1. Bulletin Board

Immediately upon beginning of onsite work, provide a weatherproof glass-covered bulletin board not less than 36 by 48 inches in size for displaying the Equal Employment Opportunity poster, a copy of the wage decision contained in the contract, Wage Rate Information poster, and other information approved by the Contracting Officer. Locate the bulletin board at the project site in a conspicuous place easily accessible to all employees, as approved by the Contracting Officer. Display legible copies of the aforementioned data until work is completed. Remove the bulletin board from the site upon completion of the project.

#### 1.3.2. Project and Safety Signs

Erect a project sign and a site safety sign with informational details as provided by the Government at the Post award conference, within 15 days prior to any work activity on project site. Update the safety sign data daily, with light colored metallic or non-metallic numerals. Remove the signs from the site upon completion of the project. Engineer Pamphlet EP 310-1-6a contains the standardized layout and construction details for the signs. It can be found through a GOOGLE Search or try <http://www.usace.army.mil/publications/eng-pamphlets/ep310-1-6a/s-16.pdf>.

### 1.4. PROTECTION AND MAINTENANCE OF TRAFFIC

Provide access and temporary relocated roads as necessary to maintain traffic. Maintain and protect traffic on all affected roads during the construction period except as otherwise specifically directed by the Contracting Officer. Take measures for the protection and diversion of traffic, including the provision of watchmen and flagmen, erection of barricades, placing of lights around and in front of equipment and the work, and the erection and maintenance of adequate warning, danger, and direction signs, as required by the State and local authorities having jurisdiction. Protect the traveling public from damage to person and property.

The Contractor's traffic on roads selected for hauling material to and from the site shall interfere as little as possible with public traffic. Investigate the adequacy of existing roads and the allowable load limit on these roads. Repair any damage to roads caused by construction operations.

#### 1.4.1. Haul Roads

The Contractor shall, at its own expense, construct access and haul roads necessary for proper prosecution of the work under this contract. Construct haul roads with suitable grades and widths. Avoid sharp curves, blind corners, and dangerous cross traffic. Provide necessary lighting, signs, barricades, and distinctive markings for the safe movement of traffic. The method of dust control, although optional, shall be adequate to ensure safe operation at all times. Location, grade, width, and alignment of construction and hauling roads shall be subject to approval by the Contracting Officer. Provide adequate lighting to assure full and clear visibility for full width of haul road and work areas during any night work operations. Remove haul roads designated by the Contracting Officer upon completion of the work and restore those areas.

#### 1.4.2. Barricades

Erect and maintain temporary barricades to limit public access to hazardous areas. Barricades shall be required whenever safe public access to paved areas such as roads, parking areas or sidewalks is prevented by construction activities or as otherwise necessary to ensure the safety of both pedestrian and vehicular traffic. Securely place barricades clearly visible with adequate illumination to provide sufficient visual warning of the hazard during both day and night.

### 1.5. MAINTENANCE OF CONSTRUCTION SITE

Mow grass and vegetation located within the boundaries of the construction site for the duration of the project, from NTP to contract completion. Edge or neatly trim grass and vegetation along fences, buildings, under trailers, and in areas not accessible to mowers from NTP to contract completion.

### 1.6. GOVERNMENT FIELD OFFICE

#### 1.6.1. Resident Engineer's Office

Provide the Government Resident Engineer with an office, approximately 560 square feet in floor area, co-located on the project site with the Contractor's office and providing space heat, air conditioning, electric light and power, power and communications outlets and toilet facilities consisting of at least one lavatory and at least one water closet complete with connections to water and sewer mains. Provide a mail slot in the door or a lockable mail box mounted on the surface of the door. Provide outlets for 4 government phones and same number of LAN connections for Government computers. Coordinate with the Resident Engineer for locations. Provide a conference room with space large enough for 8 personnel to hold meetings. Provide a minimum of two outlets per government work station and at least one outlet per 10 feet of wall space for other government equipment. Provide at least twice weekly janitorial service. Remove the office facilities upon completion of the work and restore those areas. Connect and disconnect utilities in accordance with local codes and to the satisfaction of the Contracting Officer.

#### 1.6.2. Trailer-Type Mobile Office

The Contractor may, at its option, furnish and maintain a trailer-type mobile office acceptable to the Contracting Officer and providing as a minimum the facilities specified above. Securely anchor the trailer to the ground at all four corners to guard against movement during high winds, per EM 385-1-1.

End of Section 01 50 02

**SECTION 01 57 20.00 10  
ENVIRONMENTAL PROTECTION**

**1.0 GENERAL REQUIREMENTS**

- 1.1. SUBCONTRACTORS
- 1.2. ENVIRONMENTAL PROTECTION PLAN
- 1.3. PROTECTION FEATURES
- 1.4. ENVIRONMENTAL ASSESSMENT OF CONTRACT DEVIATIONS
- 1.5. NOTIFICATION

**2.0 PRODUCTS (NOT USED)**

**3.0 EXECUTION**

- 3.1. LAND RESOURCES
- 3.2. WATER RESOURCES
- 3.3. AIR RESOURCES
- 3.4. CHEMICAL MATERIALS MANAGEMENT AND WASTE DISPOSAL
- 3.5. RECYCLING AND WASTE MINIMIZATION
- 3.6. HISTORICAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES
- 3.7. BIOLOGICAL RESOURCES
- 3.8. INTEGRATED PEST MANAGEMENT
- 3.9. PREVIOUSLY USED EQUIPMENT
- 3.10. MILITARY MUNITIONS
- 3.11. TRAINING OF CONTRACTOR PERSONNEL
- 3.12. POST CONSTRUCTION CLEANUP

## 1.0 GENERAL REQUIREMENTS

Minimize environmental pollution and damage that may occur as the result of construction operations. Protect the environmental resources within the project boundaries and those affected outside the limits of permanent work during the entire duration of this contract. Comply with all applicable environmental Federal, State, and local laws and regulations. The Contractor shall be responsible for any delays resulting from failure to comply with environmental laws and regulations

### 1.1. SUBCONTRACTORS

Ensure compliance with this section by subcontractors.

### 1.2. ENVIRONMENTAL PROTECTION PLAN

1.2.1. The purpose of the Environmental Protection Plan is to present a comprehensive overview of known or potential environmental issues which the Contractor must address during construction. Define issues of concern within the Environmental Protection Plan as outlined in this section. Address each topic in the plan at a level of detail commensurate with the environmental issue and required construction task(s). Identify and discuss topics or issues which are not identified in this section, but which the Contractor considers necessary, after those items formally identified in this section. Prior to commencing construction activities or delivery of materials to the site, submit the Plan for review and Government approval. The Contractor shall meet with the Government prior to implementation of the Environmental Protection Plan, for the purpose of discussing the implementation of the initial plan; possible subsequent additions and revisions to the plan including any reporting requirements; and methods for administration of the Contractor's Environmental Plans. Maintain and keep the Environmental Protection Plan current onsite.

#### 1.2.2. Compliance

No requirement in this Section shall be construed as relieving the Contractor of any applicable Federal, State, and local environmental protection laws and regulations. During Construction, the Contractor shall be responsible for identifying, implementing, and submitting for approval any additional requirements to be included in the Environmental Protection Plan.

#### 1.2.3. Contents

The plan shall include, but shall not be limited to, the following:

1.2.3.1. Name(s) of person(s) within the Contractor's organization who is(are) responsible for ensuring adherence to the Environmental Protection Plan.

1.2.3.2. Name(s) and qualifications of person(s) responsible for manifesting hazardous waste to be removed from the site, if applicable

1.2.3.3. Name(s) and qualifications of person(s) responsible for training the Contractor's environmental protection personnel

1.2.3.4. Description of the Contractor's environmental protection personnel training program

1.2.3.5. An erosion and sediment control plan which identifies the type and location of the erosion and sediment controls to be provided. Include monitoring and reporting requirements to assure that the control measures are in compliance with the erosion and sediment control plan, Federal, State, and local laws and regulations. A Storm Water Pollution Prevention Plan (SWPPP) may be substituted for this plan.

1.2.3.6. Drawings showing locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on the site

1.2.3.7. Traffic control plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather. Include measures to minimize the amount of mud transported onto paved public roads by vehicles or runoff.

1.2.3.8. Work area plan showing the proposed activity in each portion of the area and identifying the areas of limited use or nonuse. Include measures for marking the limits of use areas including methods for protection of features to be preserved within authorized work areas.

1.2.3.9. Drawing showing the location of on-installation borrow areas.

1.2.3.10. A spill control plan shall include the procedures, instructions, and reports to be used in the event of an unforeseen spill of a substance regulated by 40 CFR 68, 40 CFR 302, 40 CFR 355, and/or regulated under State or Local laws and regulations. The spill control plan supplements the requirements of EM 385-1-1. This plan shall include as a minimum:

- (a) The name of the individual who will report any spills or hazardous substance releases and who will follow up with complete documentation. This individual shall immediately notify the Government and the local Fire Department in addition to the legally required Federal, State, and local reporting channels (including the National Response Center 1-800-424-8802) if a reportable quantity is released to the environment. The plan shall contain a list of the required reporting channels and telephone numbers.
- (b) The name and qualifications of the individual who will be responsible for implementing and supervising the containment and cleanup
- (c) Training requirements for Contractor's personnel and methods of accomplishing the training
- (d) A list of materials and equipment to be immediately available at the job site, tailored to cleanup work of the potential hazard(s) identified.
- (e) The names and locations of suppliers of containment materials and locations of additional fuel oil recovery, cleanup, restoration, and material-placement equipment available in case of an unforeseen spill emergency
- (f) The methods and procedures to be used for expeditious contaminant cleanup

1.2.3.11. A solid waste management plan identifying waste minimization, collection, and disposals methods, waste streams (type and quantity), and locations for solid waste diversion/disposal including clearing debris and C&D waste that is diverted (salvaged, reused, or recycled). Detail the contractor's actions to comply with, and to participate in, Federal, state, regional, local government, and installation sponsored recycling programs to reduce the volume of solid waste at the source. Identify any subcontractors responsible for the transportation, salvage and disposal of solid waste. Submit licenses or permits for solid waste disposal sites that are not a commercial operating facility. Attach evidence of the facility's ability to accept the solid waste to this plan. A construction and demolition waste management plan, similar to the plan specified in the UFGS 01 74 19 (formerly 01572) may be used as the non-hazardous solid waste management plan. Provide a Non-Hazardous Solid Waste Diversion Report. Submit the report on the first working day after the first quarter that non-hazardous solid waste has been disposed and/or diverted and each quarter thereafter (e.g. the first working day of January, April, July, and October) until the end of the project. Additionally, a summary report, with all data fields, is required at the end of the project. The report shall indicate the total type and amount of waste generated, total type and amount of waste diverted, type and amount of waste sent to waste-to-energy facility and alternative daily cover, in tons along with the percent that was diverted. Maintain, track and report construction and demolition waste data in a manner such that the installation can enter the data into the Army SWAR database, which separates data by type of material. A cumulative report in LEED Letter Template format may be used but must be modified to include the date disposed of/diverted and include the above stated diversion data. NOTE: The Solid Waste Diversion Reports are separate documentation than the LEED documentation.

1.2.3.12. DELETED.

1.2.3.13. An air pollution control plan detailing provisions to assure that dust, debris, materials, trash, etc., do not become air borne and travel off the project site.

1.2.3.14. A contaminant prevention plan that: identifies potentially hazardous substances to be used on the job site; identifies the intended actions to prevent introduction of such materials into the air, water, or ground; and details provisions for compliance with Federal, State, and local laws and regulations for storage and handling of



these materials. In accordance with EM 385-1-1, include a copy of the Material Safety Data Sheets (MSDS) and the maximum quantity of each hazardous material to be on site at any given time in the contaminant prevention plan. Update the plan as new hazardous materials are brought on site or removed from the site. Reference this plan in the storm water pollution prevention plan, as applicable.

1.2.3.15. A waste water management plan that identifies the methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines. If a settling/retention pond is required, include the design of the pond including drawings, removal plan, and testing requirements for possible pollutants. If land application will be the method of disposal for the waste water, include a sketch showing the location for land application along with a description of the pretreatment methods to be implemented and any required permits. If surface discharge will be the method of disposal, include a copy of the permit and associated documents as an attachment prior to discharging the waste water. If disposal is to a sanitary sewer, include documentation that the waste water treatment plant Operator has approved the flow rate, volume, and type of discharge.

1.2.3.16. A historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands known to be on the project site: and/or identifies procedures to be followed if historical archaeological, cultural resources, biological resources and wetlands not previously known to be onsite or in the area are discovered during construction. Include methods to assure the protection of known or discovered resources and shall identify lines of communication between Contractor personnel and the Government.

1.2.3.17. A pesticide treatment plan, updated, as information becomes available. Include: sequence of treatment, dates, times, locations, pesticide trade name, EPA registration numbers, authorized uses, chemical composition, formulation, original and applied concentration, application rates of active ingredient (i.e. pounds of active ingredient applied), equipment used for application and calibration of equipment. The Contractor is responsible for Federal, State, Regional and Local pest management record keeping and reporting requirements as well as any additional Installation specific requirements. Follow AR 200-1, Chapter 5, Pest Management, Section 5-4, "Program Requirements" for data required to be reported to the Installation.

### 1.3. PROTECTION FEATURES

This paragraph supplements the Contract Clause PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES AND IMPROVEMENTS. Prior to start of any onsite construction activities, the Contractor and the Government shall make a joint condition survey. Immediately following the survey, the Contractor shall prepare a brief report including a plan describing the features requiring protection under the provisions of the Contract Clauses, which are not specifically identified on the drawings as environmental features requiring protection along with the condition of trees, shrubs and grassed areas immediately adjacent to the site of work and adjacent to the Contractor's assigned storage area and access route(s), as applicable. Both the Contractor and the Government will sign this survey, upon mutual agreement as to its accuracy and completeness. The Contractor develop a plan that depicts how it will protect those environmental features included in the survey report and any indicated on the drawings, regardless of interference which their preservation may cause to the Contractor's work under the contract.

### 1.4. ENVIRONMENTAL ASSESSMENT OF CONTRACT DEVIATIONS

Any deviations, requested by the Contractor, from the drawings, plans and specifications which may have an environmental impact will be subject to approval by the Government and may require an extended review, processing, and approval time. The Government reserves the right to disapprove alternate methods, even if they are more cost effective, if the Government determines that the proposed alternate method will have an adverse environmental impact.

### 1.5. NOTIFICATION

The Government will notify the Contractor in writing of any observed noncompliance with Federal, State or local environmental laws or regulations, permits, and other elements of the Contractor's Environmental Protection plan. The Contractor shall, after receipt of such notice, inform the Government of the proposed corrective action and take such action when approved by the Government. The Government may issue an order stopping all or part of the

work until satisfactory corrective action has been taken. No time extensions shall be granted or equitable adjustments allowed to the Contractor for any such suspensions. This is in addition to any other actions the Government may take under the contract, or in accordance with the Federal Acquisition Regulation or Federal Law.

## **2.0 PRODUCTS (NOT USED)**

## **3.0 EXECUTION**

### **3.1. LAND RESOURCES**

Confine all activities to areas defined by the drawings and specifications. Prior to the beginning of any construction, identify any land resources to be preserved within the work area. Except in areas indicated on the drawings or specified to be cleared, do not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, topsoil, and land forms without approval. Do not attach or fasten any ropes, cables, or guys to any trees for anchorage unless specifically authorized. Provide effective protection for land and vegetation resources at all times as defined in the following subparagraphs. Remove all stone, soil, or other materials displaced into uncleared areas..

#### **3.1.1. Work Area Limits**

Prior to commencing construction activities, mark the areas that need not be disturbed under this contract. Mark or fence isolated areas within the general work area which are not to be disturbed. Protect monuments and markers before construction operations commence. Where construction operations are to be conducted during darkness, any markers shall be visible in the dark. Personnel shall be knowledgeable of the purpose for marking and/or protecting particular objects.

#### **3.1.2. Landscape**

Clearly identify trees, shrubs, vines, grasses, land forms and other landscape features indicated and defined on the drawings to be preserved by marking, fencing, or wrapping with boards, or any other approved techniques. Restore landscape features damaged or destroyed during construction operations outside the limits of the approved work area.

#### **3.1.3. Erosion and Sediment Controls**

Provide erosion and sediment control measures in accordance with Federal, State, and local laws and regulations. Coordinate with approving authorities (federal, state, etc.) for specific requirements to be included in the plan. The erosion and sediment controls selected and maintained by the Contractor shall be such that water quality standards are not violated as a result of the Contractor's construction activities. Keep the area of bare soil exposed at any one time by construction operations to a minimum necessary. Construct or install temporary and permanent erosion and sediment control best management practices (BMPs). BMPs may include, but not be limited to, vegetation cover, stream bank stabilization, slope stabilization, silt fences, construction of terraces, interceptor channels, sediment traps, inlet and outfall protection, diversion channels, and sedimentation basins. Remove any temporary measures after the area has been stabilized.

#### **3.1.4. Contractor Facilities and Work Areas**

Place field offices, staging areas, stockpile storage, and temporary buildings in areas designated on the drawings or as directed by the Government. Make only approved temporary movement or relocation of Contractor facilities. Provide erosion and sediment controls for on-site borrow and spoil areas to prevent sediment from entering nearby waters. Control temporary excavation and embankments for plant and/or work areas to protect adjacent areas.

### **3.2. WATER RESOURCES**

Monitor construction activities to prevent pollution of surface and ground waters. Do not apply toxic or hazardous chemicals to soil or vegetation unless otherwise indicated. Monitor all water areas affected by construction activities. For construction activities immediately adjacent to impaired surface waters, the Contractor shall be capable of quantifying sediment or pollutant loading to that surface water when required by state or federally issued Clean Water Act permits.

### 3.2.1. Stream Crossings

Stream crossings shall allow movement of materials or equipment without violating water pollution control standards of the Federal, State, and local governments or impede state-designated flows.

### 3.2.2. Wetlands

Do not enter, disturb, destroy, or allow discharge of contaminants into any wetlands.

## 3.3. AIR RESOURCES

Comply with all Federal and State air emission and performance laws and standards for equipment operation, activities, or processes.

### 3.3.1. Particulates

Control dust particles; aerosols and gaseous by-products from construction activities; and processing and preparation of materials, such as from asphaltic batch plants, including weekends, holidays and hours when work is not in progress. Maintain excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and other work areas within or outside the project boundaries free from particulates which would cause the Federal, State, and local air pollution standards to be exceeded or which would cause a hazard or a nuisance. Sprinkling, chemical treatment of an approved type, baghouse, scrubbers, electrostatic precipitators or other methods are permitted to control particulates in the work area. Sprinkling, to be efficient, must be repeated to keep the disturbed area damp at all times. Provide sufficient, competent equipment available to accomplish these tasks. Perform particulate control as the work proceeds and whenever a particulate nuisance or hazard occurs. Comply with all State and local visibility regulations.

### 3.3.2. Odors

Control odors from construction activities at all times. Odors shall not cause a health hazard and shall be in compliance with State regulations and/or local ordinances.

### 3.3.3. Sound Intrusions

Keep construction activities under surveillance and control to minimize environment damage by noise. Comply with the provisions of the state and Installation rules.

### 3.3.4. Burning

Burning is not allowed on the project site unless specified in other sections of the specifications or by written authorization. Specific times, locations, and manners of burning shall be subject to approval.

## 3.4. CHEMICAL MATERIALS MANAGEMENT AND WASTE DISPOSAL

Disposal of wastes shall be as directed below, unless otherwise specified in other sections and/or shown on the drawings.

### 3.4.1. Solid Wastes

Place solid wastes (excluding clearing debris) in containers which are emptied on a regular schedule. Conduct handling, storage, and disposal to prevent contamination. Employ segregation measures so that no hazardous or toxic waste will become co-mingled with solid waste. Transport solid waste off Government property and dispose of it in compliance with Federal, State, and local requirements for solid waste disposal. The minimum acceptable off-site solid waste disposal option is a Subtitle D RCRA permitted landfill. Verify that the selected transporters and disposal facilities have the necessary permits and licenses to operate. Comply with Federal, State, and local laws and regulations pertaining to the use of landfill areas.

### 3.4.2. Chemicals and Chemical Wastes

Dispense chemicals, ensuring no spillage to the ground or water. Perform and document periodic inspections of dispensing areas to identify leakage and initiate corrective action. The Government may periodically review this documentation. Collect chemical waste in corrosion resistant, compatible containers. Monitor and remove collection drums to a staging or storage area when contents are within 6 inches of the top. Classify, manage, store, and dispose of wastes in accordance with Federal, State, and local laws and regulations.

#### 3.4.3. Contractor Generated Hazardous Wastes/Excess Hazardous Materials

Hazardous wastes are defined in 40 CFR 261, or are as defined by applicable state and local regulations. Hazardous materials are defined in 49 CFR 171 - 178. At a minimum, manage and store hazardous waste in compliance with 40 CFR 262. Take sufficient measures to prevent spillage of hazardous and toxic materials during dispensing. Segregate hazardous waste from other materials and wastes; protect it from the weather by placing it in a safe covered location and take precautionary measures, such as berming or other appropriate measures, against accidental spillage. Store, describe, package, label, mark, and placard hazardous waste and hazardous material in accordance with 49 CFR 171 - 178, state, and local laws and regulations. Transport Contractor generated hazardous waste off Government property in accordance with the Environmental Protection Agency and the Department of Transportation laws and regulations. Dispose of hazardous waste in compliance with Federal, State and local laws and regulations. Immediately report spills of hazardous or toxic materials to the Government and the Facility Environmental Office. Contractor will be responsible for cleanup and cleanup costs due to spills. Contractor is responsible for the disposition of Contractor generated hazardous waste and excess hazardous materials.

#### 3.4.4. Fuel and Lubricants

Conduct storage, fueling and lubrication of equipment and motor vehicles in a manner that affords the maximum protection against spill and evaporation. Manage and store fuel, lubricants and oil in accordance with all Federal, State, Regional, and local laws and regulations.

### 3.5. RECYCLING AND WASTE MINIMIZATION

Participate in State and local government sponsored recycling programs. The Contractor is further encouraged to minimize solid waste generation throughout the duration of the project. Line and berm fueling areas and establish storm water control structures at discharge points for site run-off. Keep a liquid containment clean-up kit available at the fueling area.

### 3.6. HISTORICAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

Existing historical, archaeological, and cultural resources within the Contractor's work area are shown on the drawings. Protect and preserve these resources during the life of the Contract. Temporarily suspend all activities that may damage or alter such resources, if any previously unidentified or unanticipated historical, archaeological, and cultural resources are discovered or found during excavation or other construction activities. Resources covered by this paragraph include but are not limited to: any human skeletal remains or burials; artifacts; shell, midden, bone, charcoal, or other deposits; rock or coral alignments, pavings, wall, or other constructed features; and any indication of agricultural or other human activities. Upon such discovery or find, notify the Government so that the appropriate authorities may be notified and a determination made as to their significance and what, if any, special disposition of the finds should be made. Cease all activities that may result in impact to or the destruction of these resources. Secure the area and prevent employees or other persons from trespassing on, removing, or otherwise disturbing such resources.

### 3.7. BIOLOGICAL RESOURCES

Minimize interference with, disturbance to, and damage to fish, wildlife, and plants, including their habitat. Protect threatened and endangered animal and plant species including their habitat in accordance with Federal, State, Regional, and local laws and regulations.

### 3.8. INTEGRATED PEST MANAGEMENT

Coordinate, through the Government, with the Installation Pest Management Coordinator (IPMC) at the earliest possible time prior to pesticide application, in order to minimize impacts to existing fauna and flora. Discuss

integrated pest management strategies with the IPMC and receive concurrence from the IPMC, through the COR, prior to the application of any pesticide associated with these specifications. Give IMPC personnel the opportunity to be present at all meetings concerning treatment measures for pest or disease control and during application of the pesticide. The use and management of pesticides are regulated under 40 CFR 152 - 186.

#### 3.8.1. Pesticide Delivery and Storage

Deliver pesticides, approved for use on the Installation, to the site in the original, unopened containers bearing legible labels indicating the EPA registration number and the manufacturer's registered uses.

#### 3.8.2. Qualifications

Use the services of a subcontractor for pesticide application whose principal business is pest control. The subcontractor shall be licensed and certified in the state where the work is to be performed.

#### 3.8.3. Pesticide Handling Requirements

Formulate, treat with, and dispose of pesticides and associated containers in accordance with label directions.

#### 3.8.4. Application

A state certified pesticide applicator shall apply pesticides in accordance with EPA label restrictions and recommendations.

### 3.9. PREVIOUSLY USED EQUIPMENT

Clean all previously used construction equipment prior to bringing it onto the project site. Ensure that the equipment is free from soil residuals, egg deposits from plant pests, noxious weeds, and plant seeds. Consult with the USDA jurisdictional office for additional cleaning requirements.

### 3.10. MILITARY MUNITIONS

Immediately stop work in that area and immediately inform the Government, in the event military munitions, as defined in 40 CFR 260, are discovered or uncovered.

### 3.11. TRAINING OF CONTRACTOR PERSONNEL

Train personnel in all phases of environmental protection and pollution control. Conduct environmental protection/pollution control meetings for all Contractor personnel prior to commencing construction activities. Conduct additional meetings for new personnel and when site conditions change. The training and meeting agenda shall include methods of detecting and avoiding pollution; familiarization with statutory and contractual pollution standards; installation and care of devices, vegetative covers, and instruments required for monitoring purposes to ensure adequate and continuous environmental protection/pollution control; anticipated hazardous or toxic chemicals or wastes, and other regulated contaminants; recognition and protection of archaeological sites, artifacts, wetlands, and endangered species and their habitat that are known to be in the area.

### 3.12. POST CONSTRUCTION CLEANUP

Clean up all areas used for construction in accordance with Contract Clause: "Cleaning Up". Unless otherwise instructed in writing, obliterate all signs of temporary construction facilities such as haul roads, work area, structures, foundations of temporary structures, stockpiles of excess or waste materials, and other vestiges of construction prior to final acceptance of the work. Grade, fill and seed the entire disturbed area, unless otherwise indicated.

**SECTION 01 62 35  
RECYCLED/RECOVERED MATERIAL**

**1.0 GENERAL**

1.1. REFERENCES

1.2. OBJECTIVES

1.3. EPA DESIGNATED ITEMS INCORPORATED IN THE WORK

1.4. EPA PROPOSED ITEMS INCORPORATED IN THE WORK

1.5. EPA LISTED ITEMS USED IN CONDUCT OF THE WORK BUT NOT INCORPORATED IN THE WORK

## 1.0 GENERAL

### 1.1. REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

- U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)
- 40 CFR 247 Comprehensive Procurement Guideline for Products Containing Recovered Materials

### 1.2. OBJECTIVES

Government procurement policy is to acquire, in a cost effective manner, items containing the highest percentage of recycled and recovered materials practicable consistent with maintaining a satisfactory level of competition without adversely affecting performance requirements or exposing suppliers' employees to undue hazards from the recovered materials. The Environmental Protection Agency (EPA) has designated certain items which must contain a specified percent range of recovered or recycled materials. The Contractor shall make all reasonable efforts to use recycled and recovered materials in providing the EPA designated products and in otherwise utilizing recycled and recovered materials in the execution of the work.

### 1.3. EPA DESIGNATED ITEMS INCORPORATED IN THE WORK

Materials that have been designated by EPA as being products which are or can be made with recovered or recycled materials, when incorporated into the work under this contract, shall contain at least the minimum percentage of recycled or recovered materials indicated by EPA unless adequate justification (non-availability) for non-use is provided. When a designated item is specified as an option to a non-designated item, the designated item requirements apply only if the designated item is used in the work.

### 1.4. EPA PROPOSED ITEMS INCORPORATED IN THE WORK

Products other than those designated by EPA are still being researched and are being considered for future Comprehensive Procurement Guideline (CPG) designation. It is recommended that these items, when incorporated in the work under this contract, contain the highest practicable percentage of recycled or recovered materials, provided specified requirements are also met.

### 1.5. EPA LISTED ITEMS USED IN CONDUCT OF THE WORK BUT NOT INCORPORATED IN THE WORK

There are many products listed in 40 CFR 247 which have been designated or proposed by EPA to include recycled or recovered materials that may be use by the Contractor in performing the work but will not be incorporated into the work. These products include office products, temporary traffic control products, and pallets. It is recommended that these non-construction products, when used in the conduct of the work, contain the highest practicable percentage of recycled or recovered materials and that these products be recycled when no longer needed.

End of Section 01 62 35

**SECTION 01 78 02.00 10  
CLOSEOUT SUBMITTALS**

**1.0 OVERVIEW**

- 1.1. SUBMITTALS
- 1.2. PROJECT RECORD DOCUMENTS
- 1.3. EQUIPMENT DATA
- 1.4. CONSTRUCTION WARRANTY MANAGEMENT
- 1.5. MECHANICAL TESTING, ADJUSTING, BALANCING, AND COMMISSIONING
- 1.6. OPERATION AND MAINTENANCE MANUALS
- 1.7. FIELD TRAINING
- 1.8. PRICING OF CONTRACTOR-FURNISHED AND INSTALLED PROPERTY AND GOVERNMENT-FURNISHED CONTRACTOR-INSTALLED PROPERTY
- 1.9. LEED REVIEW MEETINGS
- 1.10. RED ZONE MEETING
- 1.11. FINAL CLEANING
- 1.12. INTERIM FORM DD1354 "TRANSFER AND ACCEPTANCE OF MILITARY REAL PROPERTY"

**EXHIBIT 1 SAMPLE RED ZONE MEETING CHECKLIST**



## 1.0 OVERVIEW

### 1.1. SUBMITTALS

Government approval is required for any submittals with a "G" designation; submittals not having a "G" designation are for Designer of Record approval or for information only. Submit the following in accordance with Section 01 33 00 submittals:

#### SD-02 Shop Drawings

- As-Built Drawings - G
  - Drawings showing final as-built conditions of the project. Provide electronic drawing files as specified in Section 01 33 16, 3 sets of blue-line prints and one set of the approved working as-built drawings.

#### SD-03 Product Data

- As-Built Record of Equipment and Materials
  - Two copies of the record listing the as-built materials and equipment incorporated into the construction of the project.
- Construction Warranty Management Plan
  - Three sets of the construction warranty management plan containing information relevant to the warranty of materials and equipment incorporated into the construction project, including the starting date of warranty of construction. Furnish with each warranty the name, address, and telephone number of each of the guarantor's representatives nearest to the project location.
- Warranty Tags
  - Two record copies of the warranty tags showing the layout and design.
- Final Cleaning
  - Two copies of the listing of completed final clean-up items.

### 1.2. PROJECT RECORD DOCUMENTS

#### 1.2.1. As-Built Drawings – G

An as-built drawing is a construction drawing revised to reflect the final as-built conditions of the project as a result of modifications and corrections to the project design required during construction. The final as-built drawings shall not have the appearance of marked up drawings, but that of professionally prepared drawings as if they were the "as designed" drawings.

#### 1.2.2. Maintenance of As-Built Drawings

1.2.2.1. The Configuration Management Plan shall describe how the Contractor will maintain up-to-date drawings, how it will control and designate revisions to the drawings and specifications (In accordance with Special Contract Requirement: ***Deviating from the Accepted Design*** and Section 01 33 16: ***Design after Award***, the Designer of Record's approval is necessary for any revisions to the accepted design).

1.2.2.2. Make timely updates, carefully maintaining a record set of working as-built drawings at the job site, marked in red, of all changes and corrections from the construction drawings. Enter changes and corrections on drawings promptly to reflect "Current Construction". Perform this update no less frequently than weekly for the blue line drawings and update no less frequently than quarterly for the CADD/CAD and BIM files, which were prepared previously in accordance with Section 01 33 16. Include a confirmation that the as-builts are up to date with the submission of the monthly project schedule.

1.2.2.3. If the DB Contractor fails to maintain the as-built drawings as required herein, the Government will retain from the monthly progress payment, an amount representing the estimated monthly cost of maintaining the as-built drawings. Final payment with respect to separately priced facilities or the contract as a whole will be withheld until the Contractor submits acceptable as-built drawings and the Government approves them.

1.2.2.4. The marked-up set of drawings shall reflect any changes, alterations, adjustments or modifications. Changes must be reflected on all sheets affected by the change. Changes shall include marking the drawings to reflect structural details, foundation layouts, equipment sizes, and other extensions of design.

1.2.2.5. Typically, room numbers shown on the drawings are selected for design convenience and do not represent the actual numbers intended for use by the end user. Final as-built drawings shall reflect actual room numbers adopted by the end user.

1.2.2.6. If there is no separate contract line item (CLIN) for as-built drawings, the Government will withhold the amount of \$35,000, or 1% of the present construction value, whichever is the greater, until the final as-built drawing submittal has been approved by the Government.

### 1.2.3. Underground Utilities

The drawings shall indicate, in addition to all changes and corrections, the actual location, kinds and sizes of all sub-surface utility lines. In order that the location of these lines and appurtenances may be determined in the event the surface openings or indicators become covered over or obscured, the as-built drawings shall show, by offset dimensions to two permanently fixed surface features, the end of each run including each change in direction. Locate Valves, splice boxes and similar appurtenances by dimensioning along the utility run from a reference point. Record average elevation of the top of each run or underground structure..

### 1.2.4. Partial Occupancy

For projects where portions of construction are to be occupied or activated before overall project completion, including portions of utility systems, supply as-built drawings for those portions of the facility being occupied or activated at the time the facility is occupied or activated. Show this same as-built information previously furnished on the final set of as-built drawings.

### 1.2.5. As-Built Conditions That are Different From the construction Drawings

Accurately reflect all as-built conditions that are different, such as dimensions, road alignments and grades, and drainage and elevations, from the construction drawings on each drawing. If the as-built condition is accurately reflected on a shop drawing, then furnish that shop drawing in CADD format. Reference the final as-built construction drawing the shop drawing file that includes the as-built information. In turn, the shop drawing shall reference the applicable construction as-built drawing. Delete any options shown on drawings and not selected clearly reflect options selected on final as-built drawings.

### 1.2.6. Additional As-Built Information that Exceeds the Detail Shown on the construction Drawings:

These as-built conditions include those that reflect structural details, foundation layouts, equipment, sizes, mechanical and electrical room layouts and other extensions of design, that were not shown in the project design documents because the exact details were not known until after the time of approved shop drawings. It is recognized that these shop drawing submittals (revised showing as-built conditions) will serve as the as-built record without actual incorporation into the construction drawings, piping, and equipment drawings. Include locations of all explorations, logs of all explorations, and results of all laboratory testing, including those provided by the Government. Furnish all such shop drawings in CADD /CADformat. Include fire protection details, such as wiring, performed for the design of the project.

### 1.2.7. Final As-Built Drawings

Submit final as-built CADD/CAD and BIM Model(s) and Facility Data files at the time of Beneficial Occupancy of the project or at a designated phase of the project. In the event the Contractor accomplishes additional work after this submittal, which changes the as-built conditions, submit a new DVD with all drawing sheets and three blue-line copies of affected sheets which depict additional changes.

### 1.2.8. Title Blocks

In accordance with the configuration management plan, clearly mark title blocks to indicate final as-built drawings.

### 1.2.9. Other As-Built Documents

Provide scans of all other documents such as design analysis, catalog cuts, certification documents that are not available in native electronic format in an organized manner in Adobe.pdf format.

#### 1.2.9.1. LEED Documentation

Update LEED documentation on at least a monthly basis and have it available for review by the Government on the jobsite at all times during construction. Submit the final LEED Project Checklist(s), final LEED submittals checklist and complete project documentation, verifying the final LEED score and establishing the final rating. Provide full support to the validation review process, including credit audits. See also the LEED documentation requirements in Section 01 33 16, DESIGN AFTER AWARD.

#### 1.2.9.2. GIS Documentation

Provide final geo-referenced GIS database of the new building footprint along with any changes made to exterior of the building. The intent of capturing the final building footprint and exterior modifications in a GIS database is to provide the installation with a data set of the comprehensive changes made to the landscape as a result of the construction project. The Government will incorporate this data set into the installations existing GIS MasterPlan or Enterprise GIS system. The GIS database deliverable shall follow a standard template provided to the Contractor by the Government, adhere to detailed specifications outlined in ECB No 2006-15, and be documented using the Federal Geographic Data Committee (FGDC) metadata standard.

## 1.3. EQUIPMENT DATA

### 1.3.1. Real Property Equipment

Provide an Equipment-in-Place list of all installed equipment furnished under this contract. Include all information usually listed on manufacturer's name plate. Include the cost of each piece of installed property F.O.B. construction site. For each of the items which is specified herein to be guaranteed for a specified period from the date of acceptance thereof, provide the following information: The name, serial and model number address of equipment supplier, or manufacturer originating the guaranteed item. The Contractor's guarantee to the Government of these items will not be limited by the terms of any manufacturer's guarantee to the Contractor. Furnish the list as one (1) reproducible and three (3) copies thirty (30) calendar days before completion of any segment of the contract work which has an incremental completion date.

### 1.3.2. Maintenance and Parts Data

Furnish a brochure, catalog cut, parts list, manufacturer's data sheet or other publication showing detailed parts data on all other equipment subject to repair and maintenance procedures not otherwise required in Operations and Maintenance Manuals specified elsewhere in this contract. Distribution of directives shall follow the same requirements as listed in paragraph above.

### 1.3.3. Construction Specifications

Furnish permanent electronic files of final as-built construction specifications, including modifications thereto, with the as-built drawings.

## 1.4. CONSTRUCTION WARRANTY MANAGEMENT

1.4.1. Prior to the end of the one year warranty, the Government may conduct an infrared roof survey on any project involving a membrane roofing system. This survey will be conducted in accordance with ASTM C1153-90, "Standard Practice for Location of Wet Insulation in Roofing Systems Using Infrared Imaging". The Contractor shall replace all damaged materials and locate and repair sources of moisture penetration.

## 1.4.2. Management

### 1.4.2.1. Warranty Management Plan

Develop a warranty management plan containing information relevant to the clause **Warranty of Construction** in FAR 52.246-21. Submit the warranty management plan for Government approval at least 30 days before the planned pre-warranty conference. In the event of phased turn-over of the contract, update the Warranty Management Plan as necessary to include latest information required. Include all required actions and documents to assure that the Government receives all warranties to which it is entitled. The plan shall be in narrative form and contain sufficient detail to render it suitable for use by future maintenance and repair personnel, whether tradesmen, or of engineering background, not necessarily familiar with this contract. The term "status" as indicated below shall include due date and whether item has been submitted or was accomplished. Submit warranty information made available during the construction phase prior to each monthly pay estimate. Assemble information in a binder and turn over to the Government upon acceptance of the work. The construction warranty period shall begin on the date of project acceptance and shall continue for the full product warranty period. The Contractor, Government, including the Customer Representative shall jointly conduct warranty inspections, 4 months and 9 months, after acceptance. The warranty management plan shall include, but shall not be limited to, the following information:

- (1) Roles and responsibilities of all personnel associated with the warranty process, including points of contact and telephone numbers within the organizations of the contractors, subcontractors, manufacturers or suppliers involved.
- (2) Listing and status of delivery of all Certificates of Warranty for extended warranty items, to include roofs, HVAC balancing, pumps, motors, transformers, and for all commissioned systems such as fire protection and alarm systems, sprinkler systems, lightning protection systems, etc.
- (3) A list for each warranted equipment, item, feature of construction or system indicating:
  - (i) Name of item.
  - (ii) Model and serial numbers.
  - (iii) Location where installed.
  - (iv) Name and phone numbers of manufacturers or suppliers.
  - (v) Names, addresses and telephone numbers of sources of spare parts.
  - (vi) Warranties and terms of warranty. Include one-year overall warranty of construction. Indicate those items, which have extended warranties with separate warranty expiration dates.
  - (vii) Cross-reference to warranty certificates as applicable.
  - (viii) Starting point and duration of warranty period.
  - (ix) Summary of maintenance procedures required to continue the warranty in force.
  - (x) Cross-reference to specific pertinent Operation and Maintenance manuals.
  - (xi) Organization, names and phone numbers of persons to call for warranty service.
  - (xii) Typical response time and repair time expected for various warranted equipment.
- (4) The Contractor's plans for attendance at the 4 and 9 month post-construction warranty inspections conducted by the Government.
- (5) Procedure and status of tagging of all equipment covered by extended warranties.
- (6) Copies of instructions to be posted near selected pieces of equipment where operation is critical for warranty and/or safety reasons.

## 1.4.3. Performance Bond

1.4.3.1. The Contractor's Performance Bond will remain effective throughout the construction warranty period.

1.4.3.2. In the event the Contractor or his designated representative(s) fails to commence and diligently pursue any work required under this clause, and in a manner pursuant to the requirements thereof, the Government shall have

a right to demand that said work be performed under the Performance Bond by making written notice on the surety. If the surety fails or refuses to perform the obligation it assumed under the Performance Bond, the Government shall have the work performed by others, and after completion of the work, may make demand for reimbursement of any or all expenses incurred by the Government while performing the work, including, but not limited to administrative expenses.

1.4.3.3. In the event sufficient funds are not available to cover the construction warranty work performed by the Government at the Contractor's expense, the Government will have the right to recoup expenses from the bonding company.

1.4.3.4. Following oral or written notification of required warranty repair work, the Contractor will respond as dictated by para. 1.4.5. Written verification will follow oral instructions. Failure of the Contractor to respond will be cause for the Government to proceed against the Contractor as outlined in the paragraph 1.4.5.5 and/or above.

#### 1.4.4. Pre-Warranty Conference

Prior to contract completion, or completion of any phase or portion of contract to be turned over, and at a time designated by the Contracting Officer, the Contractor shall meet with the Government to develop a mutual understanding with respect to the requirements of this clause. Communication procedures for Contractor notification of warranty defects, priorities with respect to the type of defect, reasonable time required for Contractor response, and other details deemed necessary by the Government for the execution of the construction warranty shall be established/reviewed at this meeting. In connection with these requirements and at the time of the Contractor's quality control completion inspection, the Contractor will furnish the name, telephone number and address of a licensed and bonded company which is authorized to initiate and pursue warranty work action on behalf of the Contractor. This point of contact will be located within the local service area of the warranted construction, will be continuously available, and will be responsive to Government inquiry on warranty work action and status. This requirement does not relieve the Contractor of any of his responsibilities in connection with other portions of this provision.

#### 1.4.5. Contractor's Response to Warranty Service Requirements.

Following Government oral or written notification, which may include authorized installation maintenance personnel, the Contractor shall respond to warranty service requirements in accordance with the "Warranty Service Priority List" and the three categories of priorities listed below. Submit a report on any warranty item that has been repaired during the warranty period. The report shall include the cause of the problem, date reported, corrective action taken, and when the repair was completed. If the Contractor does not perform the construction warranty within the timeframe specified, the Government will perform the work and backcharge the construction warranty payment item established.

1.4.5.1. First Priority Code 1 Perform onsite inspection to evaluate situation, and determine course of action within 4 hours, initiate work within 6 hours and work continuously to completion or relief.

1.4.5.2. Second Priority Code 2 Perform onsite inspection to evaluate situation, and determine course of action within 8 hours, initiate work within 24 hours and work continuously to completion or relief.

1.4.5.3. Third Priority Code 3 All other work to be initiated within 3 work days and work continuously to completion or relief.

1.4.5.4. The "Warranty Service Priority List" is as follows:

- Code 1 - Air Conditioning System
  - (a) Buildings with computer equipment.
  - (b) Barracks, mess halls (entire building down).
- Code 2 - Air Conditioning Systems
  - (a) Recreational support.
  - (b) Air conditioning leak in part of building, if causing damage.
  - (c) Air conditioning system not cooling properly

- (d) Admin buildings with Automated Data Processing (ADP) equipment not on priority list.
  - Code 1 - Doors
- (a) Overhead doors not operational.
  - Code 1 - Electrical
- (a) Power failure (entire area or any building operational after 1600 hours).
- (b) Traffic control devices.
- (c) Security lights.
- (d) Smoke detectors and fire alarm systems
- (e) Power or lighting failure to an area, facility, portion of a facility, which may adversely impact health, safety, security, or the installation's mission requirement, or which may result in damage to property.
  - Code 2 - Electrical
- (a) Power failure (no power) for unoccupied buildings or portions thereof or branch circuits within occupied buildings, not listed as Code 1.
- (a) Receptacle and lights, not listed as code 1.
  - Code 3 - Electrical
- (a) Street, parking area lights
  - Code 1 - Gas
- (a) Leaks and breaks.
- (b) No gas to cantonment area.
  - Code 1 - Heat
- (a) Area power failure affecting heat.
- (b) Heater in unit not working.
  - Code 2 Heat
- (a) All heating system failures not listed as Code 1.
  - Code 3 - Interior
- (a) Floor damage
- (b) Paint chipping or peeling
  - Code 1 - Intrusion Detection Systems - N/A.
  - Code 2 - Intrusion Detection Systems other than those listed under Code 1
  - Code 1 - Kitchen Equipment
- (a) Dishwasher.
- (b) All other equipment hampering preparation of a meal.
  - Code 2 - Kitchen Equipment
- (a) All other equipment not listed under Code 1.
  - Code 2 - Plumbing
- (a) Flush valves not operating properly
- (b) Fixture drain, supply line commode, or water pipe leaking.
- (c) Commode leaking at base.
  - Code 3 - Plumbing
- (a) Leaking faucets

- Code 1 - Refrigeration
  - (a) Mess Hall.
  - (b) Medical storage.
- Code 2 - Refrigeration
  - (a) Mess hall - other than walk-in refrigerators and freezers.
- Code 1 - Roof Leaks
  - (a) Temporary repairs will be made where major damage to property is occurring.
- Code 2 - Roof Leaks
  - (a) Where major damage to property is not occurring, check for location of leak during rain and complete repairs on a Code 2 basis.
- Code 1 - Sprinkler System
  - (a) All sprinkler systems, valves, manholes, deluge systems, and air systems to sprinklers.
- Code 1 - Tank Wash Racks (Bird Baths)
  - (a) All systems which prevent tank wash.
- Code 1 - Water (Exterior)
  - (a) Normal operation of water pump station.
- Code 2 - Water (Exterior)
  - (a) No water to facility.
- Code 1 - Water, Hot (and Steam)
  - (a) Barracks (entire building).
- Code 2 - Water, Hot
  - (a) No hot water in portion of building listed under Code 1

1.4.5.5. Should parts be required to complete the work and the parts are not immediately available, the Contractor shall have a maximum of 12 hours after arrival at the job site to provide the Government, with firm written proposals for emergency alternatives and temporary repairs for Government participation with the Contractor to provide emergency relief until the required parts are available on site for the Contractor to perform permanent warranty repair. The Contractor's proposals shall include a firm date and time that the required parts shall be available on site to complete the permanent warranty repair. The Government will evaluate the proposed alternatives and negotiate the alternative considered to be in the best interest of the Government to reduce the impact of the emergency condition. Alternatives considered by the Government will include the alternative for the Contractor to "Do Nothing" while waiting until the required parts are available to perform permanent warranty repair. Negotiating a proposal which will require Government participation and the expenditure of Government funds shall constitute a separate procurement action by the using service.

#### 1.4.6. Equipment Warranty Identification Tags

1.4.6.1. Provide warranty identification tags at the time of installation and prior to substantial completion shall provide warranty identification tags on all Contractor and Government furnished equipment which the Contractor has installed.

- (a) The tags shall be suitable for interior and exterior locations, resistant to solvents, abrasion, and to fading caused by sunlight, precipitation, etc. These tags shall have a permanent pressure-sensitive adhesive back, and they shall be installed in a position that is easily (or most easily) noticeable. Tag each component of contractor furnished equipment that has differing warranties on its components.
- (b) Submit sample tags, representing how the other tags will look, for Government review and approval.
- (c) Tags for Warranted Equipment: The tag for this equipment shall be similar to the following: Exact format and size will be as approved.

## MFG WARRANTY(IES) EXPIRE

## MFG WARRANTY(IES) EXPIRE



(d) If the manufacturer's name (MFG), model number and serial number are on the manufacturer's equipment data plate and this data plate is easily found and fully legible, this information need not be duplicated on the equipment warranty tag

1.4.6.2. Execution: Complete the required information on each tag and install these tags on the equipment by the time of and as a condition of final acceptance of the equipment.

## 1.5. MECHANICAL TESTING, ADJUSTING, BALANCING, AND COMMISSIONING

Submit; all reports, statements, certificates, and completed checklists for testing, adjusting, balancing, and commissioning of mechanical systems prior to final inspection and transfer of the completed facility for approval, as specified in applicable technical specification sections.

## 1.6. OPERATION AND MAINTENANCE MANUALS

### 1.6.1. General Requirements

1.6.1.1. Inasmuch as the operations and maintenance manuals are required to operate and maintain the facility, the operations and maintenance (O&M) manuals will be considered a requirement prior to substantial completion of any facility to be turned over to the Government. Beneficial occupancy of all or portions of a facility prior to substantial completion will not relieve the Contractor of liquidated damages, if substantial completion exceeds the required completion date.

1.6.1.2. Provide one permanent electronic copy on CD-ROM and 2 hard copies of the Equipment Operating, Maintenance, and Repair Manuals. Provide separate manuals for each utility system as defined hereinafter. Submit Operations and Maintenance manuals for approval before field training or 90 days before substantial completion (whichever occurs earlier). If there is no separate CLIN for O&M Manuals, the Government will withhold an amount representing \$20,000, as non-progressed work, until submittal and approval of all O&M manuals are complete.

### 1.6.2. Definitions

#### 1.6.2.1. Equipment

A single piece of equipment operating alone or in conjunction with other equipment to accomplish a system function.

#### 1.6.2.2. System

A combination of one or more pieces of equipment which function together to accomplish an intended purpose (i.e. HVAC system is composed of many individual pieces of equipment such as fans, motors, compressors, valves, sensors, relays, etc.)

### 1.6.3. Hard Cover Binders

The manuals shall be hard cover with posts, or 3-ring binders, so sheets may be easily substituted. Print the following identification on the cover: the words "EQUIPMENT OPERATING, MAINTENANCE, AND REPAIR MANUALS," the project name, building number, and an indication of utility or systems covered, the name of the Contractor, and the Contract number. Manuals shall be approximately 8-1/2 by 11-inches with large sheets folded in and capable of being easily pulled out for reference. All manuals for the project must be similar in appearance, and be of professional quality.

### 1.6.4. Warning Page

Provide a warning page to warn of potential dangers (if they exist, such as high voltage, toxic chemicals, flammable liquids, explosive materials, carcinogens, high pressures, etc.). Place the warning page inside the front cover and in front of the title page. Include any necessary Material Safety Data Sheets (MSDS) here.

### 1.6.5. Title Page

The title page shall include the same information shown on the cover and show the name of the preparing firm and the date of publication.

#### 1.6.6. Table of Contents

Each volume of the set of manuals for this project shall include a table of contents, for the entire set, broken down by volume.

#### 1.6.7. GENERAL

Organize manuals according to the following format, and include information for each item of equipment. Submit a draft outline and table of contents for approval at 50% contract completion.

#### TABLE OF CONTENTS

##### PART I: Introduction

- Equipment Description
- Functional Description
- Installation Description

##### PART II: Operating Principles

##### PART III: Safety

##### PART IV: Preventive Maintenance

- Preventive Maintenance Checklist, Lubrication
- Charts and Diagrams

##### PART V: Spare Parts Lists

- Troubleshooting Guide
- Adjustments
- Common Repairs and Parts Replacement

##### PART VI: Illustrations

#### 1.6.7.1. Part I-Introduction

Part I shall provide an introduction, equipment or system description, functional description and theory of operation, and installation instructions for each piece of equipment. Include complete instructions for uncrating, assembly, connection to the power source and pre-operating lubrication in the installation instructions as applicable. Illustrations, including wiring and cabling diagrams, are required as appropriate in this section. Include halftone pictures of the equipment in the introduction and equipment description, as well as system layout drawings with each item of equipment located and marked. Do not use copies of previously submitted shop drawings in these manuals.

#### 1.6.7.2. Part II-Operating Principles

Part II shall provide complete instructions for operating the system, and each piece of equipment. Illustrations, halftone pictures, tables, charts, procedures, and diagrams are required when applicable. This will include step-by-step procedures for start-up and shutdown of both the system and each component piece of equipments, as well as adjustments required to obtain optimum equipment performance, and corrective actions for malfunctions. Show performance sheets and graphs showing capacity data, efficiencies, electrical characteristics, pressure drops, and flow rates here, also. Marked-up catalogs or catalog pages do not satisfy this requirement. Present performance information as concisely as possible with only data pertaining to equipment actually installed. Include actual test data collected for Contractor performance here.

#### 1.6.7.3. Part III-Safety

Part III shall contain the general and specific safety requirements peculiar to each item of equipment. Repeat safety information as notes cautions and warnings in other sections where appropriate to operations described.

#### 1.6.7.4. Part IV-Preventive Maintenance

Part IV shall contain a troubleshooting guide, including detailed instructions for all common adjustments and alignment procedures, including a detailed maintenance schedule. Also include a diagnostic chart showing symptoms and solutions to problems. Include test hookups to determine the cause, special tools and test equipment, and methods for returning the equipment to operating conditions. Information may be in chart form or in tabular format with appropriate headings. Include instructions for the removal, disassembly, repair, reassembly, and replacement of parts and assemblies where applicable and the task is not obvious.

#### 1.6.7.5. Part V-Spare Parts List

Part V shall contain a tabulation of description data and parts location illustrations for all mechanical and electrical parts. The heading of the parts list shall clearly identify the supplier, purchase order number, and equipment. Include the unit price for each part. List parts by major assemblies, and arrange the listing in columnar form. Include names and addresses of the nearest manufacturer's representatives, as well as any special warranty information. Provide a list of spare parts that are recommended to be kept in stock by the Government installation.

#### 1.6.7.6. Part VI-Illustrations

Part VI shall contain assembly drawings for the complete equipment or system and for all major components. Include complete wiring diagrams and schematics. Other illustrations, such as exploded views, block diagrams, and cutaway drawings, are required as appropriate.

#### 1.6.8. Framed Instructions

Post framed instructions are required for substantial completion. Post framed instructions under glass or in laminated plastic, including wiring and control diagrams showing the complete layout of the entire system, including equipment, ductwork, piping valves, dampers, and control sequence at a location near the equipment described. Prepare condensed operating instructions explaining preventive maintenance procedures methods of checking the system for normal safe operation, valve schedule and procedures for safely starting and stopping the system in type form, framed as specified above for the wiring and control diagrams and posted beside the diagrams. Submit proposed diagrams, instructions, and other sheets prior to posting. Post the framed instructions before field training.

#### 1.6.9. (Reserved. See 1.7 for Field Training)

#### 1.6.10. System/Equipment Requirements

##### 1.6.10.1. Facility Heating System

Provide information on the following equipment: boilers, water treatment, chemical feed pumps and tanks, converters, heat exchangers, pumps, unit heaters, fin-tube radiation, air handling units (both heating only and heating and cooling), and valves (associated with heating systems).

##### 1.6.10.2. Air-Conditioning Systems

Provide information in chillers, packaged air-conditioning equipment, towers, water treatment, chemical feed pumps and tanks, air-cooled condensers, pumps, compressors, air handling units, and valves (associated with air-conditioning systems).

##### 1.6.10.3. Temperature Control and HVAC Distribution Systems

Provide all information described for the following equipment: valves, fans, air handling units, pumps, boilers, converters and heat exchangers, chillers, water cooled condensers, cooling towers, and fin-tube radiation, control air compressors, control components (sensors, controllers, adapters and actuators), and flow measuring equipment.

#### 1.6.10.4. Central Heating Plants

Provide the information described for the following equipment: boilers, converters, heat exchangers, pumps, fans, steam traps, pollution control equipment, chemical feed equipment, control systems, fuel handling equipment, de-aerators, tanks (flash, expansion, return waters, etc.), water softeners, and valves.

#### 1.6.10.5. Heating Distribution Systems

Provide the information described for the following equipment: valves, fans, pumps, converters and heat exchangers, steam traps, tanks (expansion, flash, etc.), and piping systems.

#### 1.6.10.6. Exterior Electrical Systems

Provide information on the following equipment: power transformers, relays, reclosers, breakers, and capacitor bank controls.

#### 1.6.10.7. Interior Electrical Systems

Provide information on the following equipment: relays, motor control centers, switchgear, solid state circuit breakers, motor controller, EPS lighting systems, wiring diagrams and troubleshooting flow chart on control systems, and special grounding systems.

#### 1.6.10.8. Energy Monitoring and Control Systems

The maintenance manual shall include descriptions of maintenance for all equipment, including inspection, periodic preventative maintenance, fault diagnosis, and repair or replacement of defective components.

#### 1.6.10.9. Domestic Water Systems

Provide the identified information on the following equipment: tanks, unit process equipment, pumps, motors, control and monitoring instrumentation, laboratory test equipment, chemical feeders, valves, switching gear, and automatic controls.

#### 1.6.10.10. Wastewater Treatment Systems

Provide the identified information on the following equipment: tanks, unit process equipment, pumps, motors, control and monitoring instrumentations, laboratory test equipment chemical feeders, valves, scrapers, skimmers, comminutors, blowers, switching gear, and automatic controls.

#### 1.6.10.11. Fire Protection Systems

Provide information on the following equipment: alarm valves, manual valves, regulators, foam and gas storage tanks, piping materials, sprinkler heads, nozzles, pumps, and pump drivers.

#### 1.6.10.12. Fire Alarm and Detection Systems

- (1) The maintenance manual shall include description of maintenance for all equipment, including inspection, periodic preventive maintenance, fault diagnosis, and repair or replacement of defective components.
- (2) Provide all software; database with complete identification of programmable portions of system equipment and devices, and all other system programming data on all modes of the system; connecting cables; and proprietary equipment necessary for the operation, maintenance, testing, repair and programming, etc. of the system and that may be required for implementation of future changes to the fire system (additional and/or relocated initiating devices, notification devices, etc.
- (3) Provide all system and equipment technical data and computer software with the requisite rights to Government use, in accordance with the applicable contract clauses.
- (4) Training shall include software and programming required for the effective operation, maintenance, testing, diagnostics and expansion of the system.

#### 1.6.10.13. Plumbing Systems

Provide information on the following equipment: water heaters, valves, pressure regulators backflow preventors, piping materials, and plumbing fixtures.

#### 1.6.10.14. Liquid Fuels Systems

Provide information on the following equipment: tanks, automatic valves manual valves, filter separators, pumps, mechanical loading arms, nozzles, meters, electronic controls, electrical switch gear, and fluidic controls.

#### 1.6.10.15. Cathodic Protection Systems

Provide information on the following material and equipment: rectifiers, meters, anodes, anode backfill, anode lead wire, insulation material and wire size, automatic controls (if any), rheostats, switches, fuses and circuit breakers, type and size of rectifying elements, type of oil in oil-immersed rectifiers, and rating of shunts.

#### 1.6.10.16. Generator Installations

Provide information on the following equipment: generator sets, automatic transfer panels, governors, exciters, regulators starting systems, switchgear, and protective devices.

#### 1.6.10.17. Miscellaneous Systems

Provide information on the following: communication and ADP systems, security and intrusion alarm, elevators, material handling, active solar, photovoltaic, nurse call, paging, intercom, closed circuit TV, irrigation, sound and material delivery systems, kitchen, refrigeration, disposal, ice making equipment, and other similar type special systems not otherwise specified.

#### 1.6.10.18. Laboratory, Environmental and Pollution Control Systems

Provide information on the following equipment: wet scrubbers, quench chambers, scrub tanks, liquid oil separators, and fume hoods.

### 1.7. FIELD TRAINING

Field Training is a requirement for substantial completion. Conduct a training course for the operating staff for each particular system. Conduct the training is to be conducted during hours of normal working time after the system is functionally complete. The field instructions shall cover all of the items contained in the Equipment Operating, Maintenance and Repair Manuals. The training will include both classroom and "hands-on" training. Submit a lesson plan outlining the information to be discussed during training periods. Submit this lesson plan for approval 90 days before contract completion before the field training occurs. Record training on DVD and furnish to the Government within ten (10) days following training. Document all training and furnish a list of all attendees.

### 1.8. PRICING OF CONTRACTOR-FURNISHED AND INSTALLED PROPERTY AND GOVERNMENT-FURNISHED CONTRACTOR-INSTALLED PROPERTY

Promptly furnish and require any sub-contractor or supplier to furnish, in like manner, unit prices and descriptive data required by the Government for Property Record purposes of fixtures and equipment furnished and/or installed by the Contractor or sub-contractor, except prices do not need to be provided for Government-Furnished Property.

### 1.9. LEED REVIEW MEETINGS

1.9.1. Pre-Closeout Meeting. Approximately 30 days before submittal of LEED closeout documentation, the Contractor and the Government's project delivery team (including Installation representative) will meet to review the documentation, determine which, if any, credits will be audited and identify any corrections/missing items prior to the closeout LEED documentation submittal.

1.9.2. Approximately 14 days after submittal of LEED closeout documentation, the Contractor and the Government's project delivery team (including Installation representative) will meet to review the LEED closeout

documentation. The review conference will include discussion of and resolution of all review comments to ensure consensus on achievement of credits and satisfactory documentation. At the review conference a final score will be determined and endorsed in writing by all parties.

#### 1.10. RED ZONE MEETING

At approximately 80% of contract completion or 60 days before the anticipated Beneficial Occupancy Date (BOD), whichever occurs first, the Contractor and the Government's project delivery team will conduct what is known as the Red Zone Meeting to discuss the close-out process, to schedule the events and review responsibilities for actions necessary to produce a timely physical, as well as fiscal, project close-out. The Red Zone meeting derives its name from the football term used to describe the team effort to move the ball the last 20 yards into the end zone. The close-out of a construction project sometimes can be equally as hard and most definitely requires the whole team's efforts. The ACO will chair the meeting. If not already provided, shortly before the meeting, the Contractor shall provide an electronic copy or access to the CADD as-built drawings, completed commensurate with the amount of work completed at the time of the Red Zone Meeting, as an indicator of the Contractors' understanding of and ability to meet the USACE CADD Standards and to ensure that the Contractor is making progress with CADD As-Built requirements. EXHIBIT 1 is a generic meeting checklist.

#### 1.11. FINAL CLEANING

Clean the premises in accordance with FAR clause 52.236-12 and additional requirements stated here. Remove stains, foreign substances, and temporary labels from surfaces. Vacuum carpet and soft surfaces. Clean equipment and fixtures to a sanitary condition. Clean or replace filters of operating equipment if cleaning isn't possible or practicable. Remove debris from roofs, drainage systems, gutters, and downspouts. Sweep paved areas and rake clean landscaped areas. Remove waste, surplus materials, and rubbish from the site. Remove all temporary structures, barricades, project signs, fences and construction facilities. Submit a list of completed clean-up items on the day of final inspection.

#### 1.12. INTERIM FORM DD1354 "TRANSFER AND ACCEPTANCE OF MILITARY REAL PROPERTY

Near the completion of Project, but a minimum of 60 days prior to final acceptance of the work, complete, update draft provided with the final design package(s) (see Section 01 33 16, paragraph 3.7.5) and submit an accounting of all installed property on Interim Form DD1354 "Transfer and Acceptance of Military Real Property." Include any additional assets/improvements/alterations and cost updates from the Draft DD Form 1354. Contact the COR for any project specific information necessary to complete the DD Form 1354. This form will be a topic for the Red Zone Meeting discussed above. For information purposes, a blank DD Form 1354 (fill-able) in ADOBE (PDF) may be obtained at the following web site: <http://www.dtic.mil/whs/directives/infomgt/forms/eforms/dd1354.pdf> Submit the completed Checklist for Form DD1354 of Government-Furnished and Contractor-Furnished/Contractor Installed items. Attach this list to the updated DD Form 1354. Instructions for completing the form and a blank checklist (fill-able) in ADOBE (PDF) may be obtained at the following web site: [http://www.wbdg.org/ccb/DOD/UFC/ufc\\_1\\_300\\_08.pdf](http://www.wbdg.org/ccb/DOD/UFC/ufc_1_300_08.pdf)

## EXHIBIT 1

**SAMPLE**

## Red Zone Meeting Checklist

Date: \_\_\_\_\_

<b>Contract No.</b>	
<b>Description / Location</b>	
<b>Contractor</b>	
<b>Contracting Officer</b>	

Action	Completion Milestone	√
Inspections		
Fire		
Safety		
Pre-final		
Mechanical Test & Balance		
Commissioning		
Landscaping Complete		
Erosion Control		
Beneficial Occupancy Date (BOD)		
Furniture Installation		
Comm Installation		
As-Built Drawings		
Provide all O&M manuals, tools, shop drawings, spare parts, etc. to customer		
Training of O&M Personnel		
Provide Warranty documents to Customer		
Contract completion		

Monday, January 31, 2011

Ribbon cutting		
Payroll Clearances		
DD Form 2626 - Construction Contractor Performance Evaluation		
DD Form 2631 – A-E Performance Rated after Construction		
Status of Pending Mods and REA's/Claims		
Final Payment Completed		
Release of Claims		
Return of Unobligated Funds		
Move Project from CIP to General Ledger		
Financial completion		

End of Section 01 78 02.00 10



SUBSURFACE EXPLORATION REPORT  
(PRELIMINARY)

Brigade Complex – Tactical Equipment Maintenance Facilities  
PN 64342, FY-11  
Fort Bragg, North Carolina



By  
Soils Section  
Geotechnical & HTRW Branch  
U.S. Army Engineer District, Savannah

May 2010

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**ATTACHMENTS****ATTACHMENT A**

Soil Test Boring Location Plan

**ATTACHMENT B**

Legend and Logs of Explorations

## SUBSURFACE EXPLORATION REPORT (PRELIMINARY)

Brigade Complex – Tactical Equipment Maintenance Facilities  
PN 64342, FY-11  
Fort Bragg, North Carolina

**1. PURPOSE.** The Government has conducted a preliminary geotechnical investigation for the proposed project. This subsurface characterization report provides a general overview of the site conditions, including subsurface soil and groundwater conditions, with detailed descriptions at individual exploration locations.

**2. QUALIFICATION OF REPORT.** The preliminary field explorations performed for this report were made to determine the subsurface soil and groundwater conditions and were not intended to serve as an assessment of site environmental conditions. No effort was made to define, delineate, or designate any areas of environmental concern or of contamination. The contractor's team shall include a licensed geotechnical engineer to interpret the report and develop foundation and earthwork recommendations and design parameters. If any additional subsurface investigations or laboratory analyses are required to better characterize the site or to develop the final design, they shall be performed under the direction of a licensed geotechnical engineer and shall be the full responsibility of the contractor. A final geotechnical evaluation report shall be prepared by the licensed geotechnical engineer and submitted along with the first foundation design submittal.

**3. PROJECT DESCRIPTION.** The proposed project consists of the design, site preparation, and construction of Tactical Equipment Maintenance Facilities (TEMF) that is part of the improvements to the 3d Brigade Combat Team (BCT) Complex. The 3d BCT occupies barracks and maintenance facilities that do not provide essential facilities to serve all necessary functions of a Light Brigade Combat Team. The Brigade Complex, PN 64342, also includes the remodeling and addition of a Battalion Headquarters and the construction of a replacement In-Processing Facility. These additional facilities are discussed in separate Exploration Reports and will be designed and bid separately; although, all three facilities were authorized as one project. The TEMF piece of the project includes constructing a vehicle maintenance shop (VMS), deployment storage, unmanned aerial vehicle storage (UAV) storage, oil storage, open storage, HAZMAT storage, and organizational vehicle parking. The project also includes the widening of Spooner Street. Supporting facilities include sidewalks and utilities. The facilities will be constructed around existing in-use facilities consisting of 1950's era administrative buildings, a concrete hardstand, and a TEMF.

#### **4. EXPLORATION PROCEDURES.**

**a. Site Reconnaissance.** Prior to the field exploration, the proposed project site and surrounding areas were visually inspected by a geotechnical engineer. The observations were

Subsurface Exploration Report (Preliminary)  
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used in planning the exploration, in determining areas of special interest, and in relating site conditions to known geologic conditions in the area.

#### **b. Field Exploration.**

(1) Subsurface conditions at the site were explored by ten soil test borings (designated B-101 through B-110). The approximate exploration locations are shown on the plan included in Attachment A. The soil test borings were performed to depths ranging from 10 to 25 feet below ground surface.

(2) The exploration locations were established in the field by an engineer using a hand-held Global Positioning System (GPS) device having an accuracy of plus or minus 10 feet. The ground surface elevations at the boring locations were determined by interpolation from the site topography survey. The locations shown on the exploration location plan and the elevation on the logs should be considered approximate.

(3) Soil explorations were performed by Savannah District. Soil test borings were drilled using a truck-mounted Failing 1500 drill rig; a 2 1/4-inch I.D. hollow stem auger was used to advance the borehole. Split-barrel sampling with Standard Penetration Testing (SPT) was performed at intervals shown on the boring log. All soil sampling and Standard Penetration Testing were in substantial accordance with ASTM D 1586. In the Standard Penetration Test, a soil sample is obtained with a standard 1 3/8-inch I.D. by 2 inch O.D. split-barrel sampler. The sampler is first seated 6 inches and then driven an additional 12 inches with blows from a 140-pound hammer falling a distance of 30 inches. The number of blows required to drive the sampler the final 12 inches is recorded and is termed the “standard penetration resistance,” or the “N-value.” Penetration resistance, when properly evaluated, is an index of the soil’s strength, density, and foundation support capability. The water level was measured in the borehole during drilling, after drilling, and/or after 24 hours and recorded on the boring logs.

(4) All soil test boring logs graphically depicting soil descriptions and observed ground-water levels are included in Attachment B.

### **5. SITE AND SUBSURFACE CONDITIONS.**

**a. Site Description.** The site of the proposed TEMF is located in the cantonment area of Fort Bragg. The facility will be spread over two blocks bounded by Butner Road, Keerans Street, Taylor Street, and Gruber Road. Due to the fact that the existing facilities cover much of the site (discussed in Paragraph 3), approximately 70% of the area is impervious. The topography gently slopes from the north-east to the south-west at a 2 percent slope. Elevations range from 278 to 318 feet mean sea level (msl).

#### **b. Regional and Site Geology.**

(1) Fort Bragg is situated in the Sand Hills area of the Coastal Plain physiographic province of North Carolina. The Coastal Plain extends westward from the Atlantic Ocean to the

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Fall Line, a distance of about 130 miles. The Fall Line is the boundary between the Coastal Plain and the Piedmont physiographic provinces.

(2) Geologic units in the area, ranging from oldest to youngest, include the Carolina Slate Belt rocks, which comprise the basement rock, the Cape Fear Formation, and the Middendorf Formation. The Cape Fear and Middendorf Formations overlie the basement rock and are part of the generally southeastward-dipping and thickening wedge of sediments that constitute the Atlantic Coastal Plain deposits.

(3) The Middendorf Formation is exposed at land surface throughout the area. The formation is composed of tan, cross-bedded, medium- and fine-grained, micaceous quartz sand and clayey sand interbedded with clay or sandy clay lenses or layers. Layers of hematite-cemented sandstone occur locally throughout the Middendorf Formation as do thin layers of hard kaolin and kaolin-cemented sandstone. Below the water table, these units are generally friable or plastic. In places, the Middendorf Formation is a mottled orange, gray, and tan color with streaks and laminae of red and purple hematite and manganese oxide stains.

### **c. Subsurface Conditions.**

(1) Asphalt, large gravel, or topsoil was encountered in the top two to six inches of most of the borings. Below the surface layer, the soil profile is rather heterogeneous and consists of layers of poorly graded sand, silty sand, clayey sand, and inorganic silt (low liquid limit). Based on the Unified Soil Classification System, these soils are classified as SP, SM, SC, and ML, respectively. Borings B-104 through B-110 consisted only of sands. Borings B-101 and B-103 contained layers of ML (the bottom two feet of boring B-101 and a three foot layer mid-depth of boring B-103). Boring B-102 consisted of only ML with a 1.5 foot layer of SM just before termination of the boring. Standard penetration resistances, or N-values, of the borings located in the footprint of the TEMF (B-106 and B-107) ranged from 6 to 16 in the first five feet below ground and 19 to 51 in the remaining depth. These values indicate a loose to medium dense condition in the shallow soils and a medium to very dense condition in the deeper soils. N-values in the sandy soils of the other borings ranged from 4 to 42 with the lower blow counts typically within the first five feet from the ground surface. This indicates soils in a loose to dense condition. N-values in the silt layers ranged from 3 to 66, with the values less than 10 occurring within the first five feet of the ground surface. These values indicate silts of a soft to hard consistency, with the soft to medium stiff consistencies at the ground surface.

(2) The above subsurface descriptions are of a generalized nature to highlight the major subsurface stratification features and material characteristics. The stratifications shown on the logs represent the conditions only at the actual sounding locations. Variations may occur and should be expected between sounding locations. The stratification lines shown on the logs represent the approximate boundaries between the subsurface materials; the actual transitions are typically more gradual.

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#### **d. Groundwater Conditions.**

(1) Water levels were measured in the boreholes during drilling, at the completion of drilling, and/or again 24 hours after termination of drilling for most of the borings. For some borings, groundwater data was not recorded. Groundwater data was not recorded for borings B-103 through B-105 and B-107 through B-110. Boreholes B-101 and B-102 were dry during and immediately after drilling and after 24 hours. Groundwater was encountered in borehole B-106 at a depth of 18.5 feet during drilling. After 24 hours, groundwater was measured at a depth of 4.7 feet. The 24-hour water level is generally considered the true groundwater level.

(2) A “perched water” condition occurs when water seeping downward is blocked by an impermeable soil layer, such as clayey sand or clay, and saturates the more permeable soil above it. The true groundwater level can be several to many feet below the perched water level. Due to the prevalence of interbedded sands, clayey sands, and clays at the project site, perched water conditions could be encountered in the more permeable zones (cleaner sand layers) during construction. The soil test borings indicate that conditions favorable for perched water exist and could potentially occur during or after construction.

(3) Groundwater levels will fluctuate with seasonal and climatic variations, variations in subsurface soil conditions, and construction operations. Therefore, groundwater conditions in the future and at other locations on the site, may differ from the conditions encountered at the exploration locations on the dates the borings were performed for this investigation.

### **6. DRAWINGS.**

The soil test boring locations shown in Attachment A and the boring logs from Attachment B shall be shown on the final design and on the project as-built drawings completed by the design-build contractor. In addition, the selected design-build contractor shall show all boring logs, test pits logs, CPT soundings, soil laboratory test data, etc. used for design on the final design drawings and on the as-built drawings.

### **7. SPECIFICATIONS.**

It is recommended that the design-build contractor use the Savannah District’s EARTHWORK specification, 31 00 00, when editing the specifications for this project. The specification (SpecsIntact format) can be obtained from the website <http://en.sas.usace.army.mil/enweb/httproot/ae/index.htm> or by request to the project manager.

### **8. FINAL GEOTECHNICAL EVALUATION REPORT.**

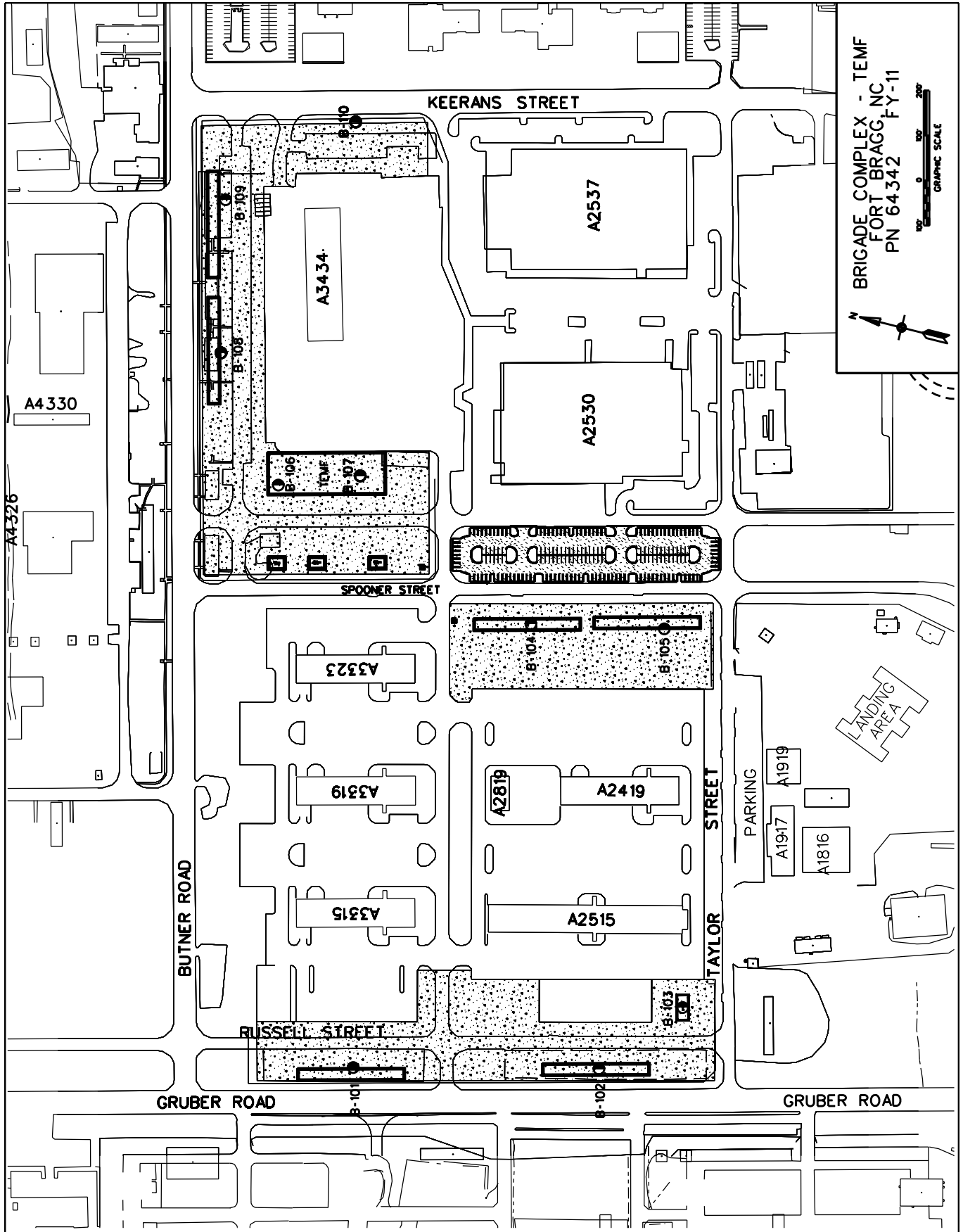
A final geotechnical evaluation report shall be prepared by the contractor’s licensed geotechnical engineer and submitted along with the first foundation design submittal. This report shall summarize the subsurface conditions and provide recommendations for the design of appropriate foundations, floor slabs, retaining walls, embankments, and pavements. The report shall recommend the type foundation system to be used, lateral load resistance capacities

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for foundation systems, allowable bearing elevations for footings, grade beams, slabs, etc. An assessment of post-construction settlement potential, including total and differential, shall be provided. Recommendations regarding lateral earth pressures (active, at-rest, passive) to be used in the design of retaining walls shall be provided. The report shall include the recommended spectral accelerations and Site Class for seismic design along with an evaluation of any seismic hazards and recommendations for mitigation, if required. Calculations shall be included to support the recommendations for bearing capacity, settlement, and pavement sections. Supporting documentation shall be included for all recommended design parameters such as Site Class, shear strength, earth pressure coefficients, friction factors, subgrade modulus, California Bearing Ratio (CBR), etc. In addition, the report shall provide earthwork recommendations; expected frost penetration; expected groundwater levels; recommendations for dewatering and groundwater control; and possible presence of any surface or subsurface features that may affect the construction of the project such as sinkholes, boulders, shallow rock, undocumented fill, old structures, soft areas, or unusual soil conditions. The design-build construction contractor should assume that they will be responsible for final connections to all site utilities (including connections from new utilities to existing utilities) unless specified otherwise in the RFP specifications.

**ATTACHEMENT A**  
**Soil Test Boring Location Plan**





## ATTACHEMENT B

### Legend and Logs of Exploration

## SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS  MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS  MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS  (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES  (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS  MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS  (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES  (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS  MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS  LIQUID LIMIT LESS THAN 50			ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS  LIQUID LIMIT GREATER THAN 50			MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

1. PROJECT		DIVISION		INSTALLATION	
TEMP		SAD		Ft. Bragg, NC	
2. LOCATION (Coordinates or Station)		10. SIZE AND TYPE OF BIT		1 3/8" ID SPT, 4" Auger	
3. DRILLING AGENCY		11. DATUM FOR ELEVATION SHOW (BM or MSL)			
SAS		12. MANUFACTURER'S DESIGNATION OF DRILL		Failing 1500 Holemaster	
4. HOLE NO. (As shown on drawing title and file number)		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		DISTURBED : 7 UNDISTURBED : 0	
B-101		14. TOTAL NUMBER CORE BOXES		N/A	
5. NAME OF DRILLER		15. ELEVATION GROUND WATER			
D. Hewett		16. DATE HOLE		STARTED : 19 Feb 2010 COMPLETED : 19 Feb 2010	
6. DIRECTION OF HOLE		17. ELEVATION TOP OF HOLE		295.2	
<input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		18. TOTAL CORE RECOVERY FOR BORING		N/A %	
7. THICKNESS OF OVERBURDEN		19. SIGNATURE OF INSPECTOR			
15.0 Ft.		Ted Zolotor, Geologist			
8. DEPTH DRILLED INTO ROCK					
0.0 Ft.					
9. TOTAL DEPTH OF HOLE					
15.0 Ft.					

ELEVATION a	DEPTH b ft.	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	CORE RECOV- ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	Blows/Ft.
	0.25		Asphalt, 0.25 ft.		Jar		
	1.55		SP Lt br poorly graded sand.		1		27
	1.75		SM Redbrown silty sand.		2		
			SC Brown clayey sand. Stiff. 3.5'		3		31
	5		SM Lt. brown to brown silty sand. 5.0'		4		11
			Clean out with auger. 6.5'			NOTE: Clean out w/auger to 8.5 ft.	
			SM Light brown and gray silty sand. 8.0'		5	NOTE: Water not encountered during, after, or 24 hr after drilling.	8
	10		SM Light brown silty sand. 10.0'		6		10
			Clean out with auger. 13.5'				
	15		ML Gray and purple silt. Stiff. 15.0'		7		39
			BOTTOM OF HOLE @ 15.0 FT.				

1. PROJECT <b>TEMP</b>		INSTALLATION <b>Ft. Bragg, NC</b>	
2. LOCATION (Coordinates or Station)		10. SIZE AND TYPE OF BIT <b>1 3/8" ID SPT, 4" Auger</b>	
3. DRILLING AGENCY <b>SAS</b>		11. DATUM FOR ELEVATION SHOWN (BM or MSL)	
4. HOLE NO. (As shown on drawing title and file number) <b>B-102</b>		12. MANUFACTURER'S DESIGNATION OF DRILL <b>Failing 1500 Holmaster</b>	
5. NAME OF DRILLER <b>D. Hewett</b>		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN DISTURBED: <b>6</b> UNDISTURBED: <b>0</b>	
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		14. TOTAL NUMBER CORE BOXES <b>N/A</b>	
7. THICKNESS OF OVERBURDEN <b>15.0 FT.</b>		15. ELEVATION GROUND WATER <b>N/A</b>	
8. DEPTH DRILLED INTO ROCK <b>0.0 FT.</b>		16. DATE HOLE STARTED: <b>19 Feb 2010</b> COMPLETED: <b>19 Feb 2010</b>	
9. TOTAL DEPTH OF HOLE <b>15.0 FT.</b>		17. ELEVATION TOP OF HOLE <b>310.9</b>	
		18. TOTAL CORE RECOVERY FOR BORING <b>N/A</b> %	
		19. SIGNATURE OF INSPECTOR <b>Ked Ziolan, Geologist</b>	

ELEVATION a	DEPTH b ft.	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOV- ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	Blows/Ft. h
	0		Asphalt, 0.20 ft.		Jar		
			ML Lt brown and gray sandy silt.		1	NOTE: Clean out w/ auger	18
			ML Same as above.		2	to 2.0 ft.	3
	5				3		4
			Clean out with auger.				
			ML Same as above but dense.		4	NOTE: Clean out with auger to 8.5 ft.	66
			ML Same as above.				
	10				5	NOTE: Water not encountered during, immediately after, or 24 hr. after drilling.	45
			Clean out with auger				
	15		SM Light brown and gray fine- to-medium silty sand.		6		30
			15.0' BOTTOM OF HOLE @ 15.0 FT.				



DRILLING LOG		DIVISION <b>SAD</b>	INSTALLATION <b>Ft. Bragg, NC</b>	SHEET OF 1 SHEETS
1. PROJECT <b>TEMP</b>			10. SIZE AND TYPE OF BIT <b>1 3/8" ID SPT, 4" Auger</b>	
2. LOCATION (Coordinates or Station)			11. DATUM FOR ELEVATION SHOWN <b>BM or MSL</b>	
3. DRILLING AGENCY <b>SAS</b>			12. MANUFACTURER'S DESIGNATION OF DRILL <b>Failing 1500 Holmaster</b>	
4. HOLE NO. (As shown on drawing title and file number) <b>B-103</b>			13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN DISTURBED: <b>5</b> UNDISTURBED: <b>0</b>	
5. NAME OF DRILLER <b>Danny Hewett</b>			14. TOTAL NUMBER CORE BOXES <b>N/A</b>	
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			15. ELEVATION GROUND WATER	
7. THICKNESS OF OVERBURDEN <b>10.0 FT.</b>			16. DATE HOLE STARTED <b>19 Feb 10</b> COMPLETED <b>19 Feb 10</b>	
8. DEPTH DRILLED INTO ROCK <b>0.0 FT.</b>			17. ELEVATION TOP OF HOLE <b>317.0</b>	
9. TOTAL DEPTH OF HOLE <b>10.0 FT.</b>			18. TOTAL CORE RECOVERY FOR BORING <b>N/A</b> %	
			19. SIGNATURE OF INSPECTOR <b>Ted Zilberhan, Geologist</b>	

ELEVATION °	ft. DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOV- ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	Blows/Ft.
	0		SM Brown fine to medium grained silty sand with pieces of brick.		1		
	1.5'		Clean out to 2.0 ft.				20
	2		SM Light brown fine to medium grained silty sand.		2		
	3.5'		ML Light brown sandy silt.		3		10
	5.0'		Clean out to 6.5 ft.				12
	6		SM Light brown fine to coarse silty sand.		4		
	8.0'		Clean out to 8.5 ft.				34
	8.5'		SM Tan and light brown fine to medium grained silty sand.		5		
	10		Bottom of Hole @ 10.0 ft.				37

DRILLING LOG		DIVISION SOUTH ATLANTIC		INSTALLATION SAVANNAH DISTRICT		SHEET 1 OF 1 SHEETS	
1. PROJECT <b>TEMP</b>				10. SIZE AND TYPE OF BIT <b>1 3/8" ID SPT; Auger</b>			
2. LOCATION (Coordinates or Station)				11. DATUM FOR ELEVATION SHOWN <b>BM or MSL</b>			
3. DRILLING AGENCY SAVANNAH DISTRICT				12. MANUFACTURER'S DESIGNATION OF DRILL <b>Failing 1500 Holmaster</b>			
4. HOLE NO. (As shown on drawing title and file number) <b>B-104</b>				13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN <b>6</b>		DISTURBED <b>0</b> UNDISTURBED	
5. NAME OF DRILLER DANNY HEWITT				14. TOTAL NUMBER CORE BOXES <b>N/A</b>			
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.				15. ELEVATION GROUND WATER			
7. THICKNESS OF OVERBURDEN <b>15.0 Ft.</b>				16. DATE HOLE <b>22 Feb 2010</b> STARTED <b>22 Feb 2010</b> COMPLETED			
8. DEPTH DRILLED INTO ROCK <b>0.0 Ft.</b>				17. ELEVATION TOP OF HOLE <b>303.4</b>			
9. TOTAL DEPTH OF HOLE <b>15.0 Ft.</b>				18. TOTAL CORE RECOVERY FOR BORING <b>N/A</b> %			
				19. SIGNATURE OF INSPECTOR <b>Red Zelenka, Geologist</b>			
ELEVATION a	DEPTH FEET c	LEGEND	CLASSIFICATION OF MATERIALS (Description) d	CORE RECOV- ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	BLOWS/FT: h
	0		<b>Lg. Gravel, 0.5 ft.</b>		<b>Jar</b>		
			<b>SM DK br f-m silty sd w/rock</b>		<b>1</b>		<b>16</b>
			<b>SP Tan f-m prly grdd sd.</b>		<b>2</b>		<b>10</b>
			<b>Lt brown f-med poorly graded sand w/ tr silt. 5.0</b>		<b>3</b>		<b>11</b>
	5		<b>Cleaned out with auger. 6.5</b>				
			<b>SP Lt brown f-med poorly grdd sand. 8.0</b>		<b>4</b>		<b>32</b>
			<b>SP Lt br f-m prly grdd sand w/ silty sand layers</b>		<b>5</b>		<b>36</b>
	10		<b>Cleaned out w/ auger.</b>				
			<b>13.5</b>				
			<b>SM Lt br f-m silty sand.</b>		<b>6</b>		<b>33</b>
	15		<b>Bottom of Hole @ 15.0'</b>				
SOILS ARE FIELD VISUALLY CLASSIFIED IN ACCORDANCE WITH THE UNIFIED SOIL CLASSIFICATION SYSTEM				BLOWS/FOOT: NUMBER REQUIRED TO DRIVE 1 3/8" ID SPLITSPOON WITH 140 LB. HAMMER FALLING 30 INCHES			



DIVISION <b>SAD</b>		INSTALLATION <b>Ft. Bragg, NC</b>	SHEET OF 1 SHEETS
1. PROJECT <b>TEMF</b>		10. SIZE AND TYPE OF BIT <b>1 3/8" ID SPT, 4" Auger</b>	
2. LOCATION (Coordinates or Station)		11. DATUM FOR ELEVATION SHOWN (BM or MSL)	
3. DRILLING AGENCY <b>SAS</b>		12. MANUFACTURER'S DESIGNATION OF DRILL <b>Failing 1500 Holmaster</b>	
4. HOLE NO. (As shown on drawing title and file number) <b>B-105</b>		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN DISTURBED: <b>6</b> UNDISTURBED: <b>0</b>	
5. NAME OF DRILLER <b>D. Hewett</b>		14. TOTAL NUMBER CORE BOXES <b>N/A</b>	
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER <b>N/A</b>	
7. THICKNESS OF OVERBURDEN <b>15.0 Ft.</b>		16. DATE HOLE STARTED: <b>22 Feb 2010</b> COMPLETED: <b>22 Feb 2010</b>	
8. DEPTH DRILLED INTO ROCK <b>0.0 Ft.</b>		17. ELEVATION TOP OF HOLE <b>302.3</b>	
9. TOTAL DEPTH OF HOLE <b>15.0 Ft.</b>		18. TOTAL CORE RECOVERY FOR BORING <b>N/A</b> %	
		19. SIGNATURE OF INSPECTOR <b>Ted Ziegler, Geologist</b>	

ELEVATION a	DEPTH b ft.	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVER- ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	Blows/Ft. h
	0		Lg. Gravel, 0.5 ft.		Jar		
			SM Tan-br f-m silty sd w/rocks.		1		26
			SP Tan-br f-m prly grdd sand.		2		10
5			5.0'		3		7
			Cleaned out with auger				
			6.5'				
			SM Lt br f-med poorly graded sand w/silty sand layers.		4	NOTE: Cleaned out with auger to 8.5 ft.	26
10			No recovery.		5	NOTE: Fall-in (rocks) blocked split spoon.	37
			10.0'				
			Cleaned out with auger				
			13.5'				
15			SP Br to lt br fine poorly graded sand w/trace silt.		6		24
			Bottom of Hole @ 15.0 ft.				



DRILLING LOG		DIVISION SOUTH ATLANTIC		INSTALLATION SAVANNAH DISTRICT		SHEET 1 OF 1 SHEETS	
1. PROJECT <b>TEMP</b>				10. SIZE AND TYPE OF BIT <b>1 3/8" SPT, 4" Auger</b>			
2. LOCATION (Coordinates or Station)				11. DATUM FOR ELEVATION SHOWN <b>TBM or MSL</b>			
3. DRILLING AGENCY SAVANNAH DISTRICT				12. MANUFACTURER'S DESIGNATION OF DRILL <b>Failing 1500 Holemaster</b>			
4. HOLE NO. (As shown on drawing title and file number) <b>B-106</b>				13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN		DISTURBED <b>8</b> UNDISTURBED <b>0</b>	
5. NAME OF DRILLER DANNY HEWITT				14. TOTAL NUMBER CORE BOXES <b>N/A</b>		15. ELEVATION GROUND WATER	
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.				16. DATE HOLE STARTED <b>20 Feb 10</b> COMPLETED <b>20 Feb 10</b>		17. ELEVATION TOP OF HOLE <b>288.6</b>	
7. THICKNESS OF OVERBURDEN <b>25.0 FT.</b>				18. TOTAL CORE RECOVERY FOR BORING <b>N/A</b> %		19. SIGNATURE OF INSPECTOR <b>Ted Zielinski, Geologist</b>	
8. DEPTH DRILLED INTO ROCK <b>0.0 FT.</b>							
9. TOTAL DEPTH OF HOLE <b>25.0 FT.</b>							
ELEVATION a	DEPTH FEET b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	
0			SP Br to light brown fine poorly graded sand.		1	NOTE: Augered to 15	
			SP Same as above but light brown with trace clay.		2	2.0 ft. 6	
5			Clean out with auger.		3	10	
			ML Br and gr sandy silt.		4	NOTE: Augered to 32	
			ML Brown sandy silt.		5	8.5 ft. 34	
10			Clean out with auger.			NOTE: Water encountered @ 18.5 ft. during drilling.	
			SM Lt gr f-med silty sand.		6	19	
15			Clean out with auger.			NOTE: 24-hour water level at 4.7 ft.	
			SP Tan, gr, and purple f-med poorly graded sand.		7	39	
20			Clean out with auger.				
			SP Tan to gray f-med poorly graded sand.		8	23	
25							
SOILS ARE FIELD VISUALLY CLASSIFIED IN ACCORDANCE WITH THE UNIFIED SOIL CLASSIFICATION SYSTEM				BLOWS/FOOT: NUMBER REQUIRED TO DRIVE 1 3/8" ID SPLITSPOON WITH 140 LB. HAMMER FALLING 30 INCHES			

APPENDIX A DRILLING LOG		DIVISION SOUTH ATLANTIC	INSTALLATION SAVANNAH DISTRICT	W912HN-0 SHEET 1 OF 1	Page 2
1. PROJECT <b>TEMP</b>		10. SIZE AND TYPE OF BIT <b>1 3/8" ID SPT; Auger</b>			
2. LOCATION (Coordinates or Station)		11. DATUM FOR ELEVATION SHOWN <b>TBM</b> or MSL)			
3. DRILLING AGENCY SAVANNAH DISTRICT		12. MANUFACTURER'S DESIGNATION OF DRILL <b>Failing 1500 Holmaster</b>			
4. HOLE NO. (As shown on drawing title and file number) <b>B-107</b>		13. TOTAL NO. OF OVER- BURDEN SAMPLES TAKEN			
		DISTURBED <b>8</b> UNDISTURBED <b>0</b>			
5. NAME OF DRILLER DANNY HEWITT		14. TOTAL NUMBER CORE BOXES <b>N/A</b>			
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER			
		16. DATE HOLE STARTED <b>23 Feb 2010</b> COMPLETED <b>23 Feb 2010</b>			
7. THICKNESS OF OVERBURDEN <b>25.0 Ft.</b>		17. ELEVATION TOP OF HOLE <b>290.3</b>			
8. DEPTH DRILLED INTO ROCK <b>0.0 Ft.</b>		18. TOTAL CORE RECOVERY FOR BORING <b>N/A</b> %			
9. TOTAL DEPTH OF HOLE <b>25.0 Ft.</b>		19. SIGNATURE OF INSPECTOR <b>Top Zuelke, Geologist</b>			

ELEVATION a	DEPTH FEET c	LEGEND e	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY f	BOX OR SAMPLE NO. g	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) h	BLOWS/FT. i
	0		SP Tan-br f-med poorly graded sand.		Jar		
			SP Tan f-med poorly graded sand.		1	NOTE: Cleaned	8
			SM Tan f-med silty sand.		2	out with auger	9
	5		Cleaned out with auger.		3	to 2.0 ft.	16
			SM Br f-med silty sd w/ small clay layer		4	NOTE: Cleaned	51
			SM Tan, br, + gr silty sand w/clay layers.		5	out with auger	36
	10		Cleaned out with auger.			to 2.5 ft.	
					6		22
			SM Tan fine to medium silty sand.				
	15		Cleaned out with auger.		7		37
			SM Tan fine to coarse silty sand w/occ gravel.				
	20		Cleaned out with auger.		8		25
	24.2		SM Same as above.				
	25		ML Gray sandy clay.				
			Bottom of Hole @ 25.0'				

SOILS ARE FIELD VISUALLY CLASSIFIED IN ACCORDANCE WITH THE UNIFIED SOIL CLASSIFICATION SYSTEM

BLOWS/FOOT:  
NUMBER REQUIRED TO  
DRIVE 1 3/8" ID  
SPLITSPOON WITH 140  
LB. HAMMER FALLING  
30 INCHES



DRILLING LOG		DIVISION <b>SAD</b>	INSTALLATION <b>Ft. Bragg, NC</b>	SHEET OF <b>2</b> SHEETS
1. PROJECT <b>TEMF</b>			10. SIZE AND TYPE OF BIT <b>1 3/8" ID SPT; 4" Auger</b>	
2. LOCATION (Coordinates or Station)			11. DATUM FOR ELEVATION SHOWN <b>BM or MSL</b>	
3. DRILLING AGENCY <b>SAS</b>			12. MANUFACTURER'S DESIGNATION OF DRILL <b>Failing 1500 Holemaster</b>	
4. HOLE NO. (As shown on drawing title and file number) <b>B-108</b>			13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN DISTURBED <b>8</b> UNDISTURBED <b>0</b>	
5. NAME OF DRILLER <b>Danny Hewett</b>			14. TOTAL NUMBER CORE BOXES <b>N/A</b>	
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			15. ELEVATION GROUND WATER	
7. THICKNESS OF OVERBURDEN <b>15.0 Ft.</b>			16. DATE HOLE STARTED <b>19 Feb 2010</b> COMPLETED <b>19 Feb 2010</b>	
8. DEPTH DRILLED INTO ROCK <b>0.0 Ft.</b>			17. ELEVATION TOP OF HOLE <b>283.9</b>	
9. TOTAL DEPTH OF HOLE <b>15.0 Ft.</b>			18. TOTAL CORE RECOVERY FOR BORING <b>N/A</b> %	
			19. SIGNATURE OF INSPECTOR <b>Ed Zislman, Geologist</b>	

ELEVATION a	ft. DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	CORE RECOV- ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	Blows/Ft. h
	0		Topsoil, 0.4 ft.		Jar		
			SP/SM Tan and brown fine to medium grained poorly graded silty sand.		1		11
	2		Cleaned out with auger 2.0'				
			SP Tan fine grained poorly graded sand.		2		4
	4				3		5
			Cleaned out with auger 5.0'				
	6						
			SP Same as above.		4		10
	8		Cleaned out with auger 8.0'				
			SM Tan fine to medium grained silty sand.		5		
	10		SP Light brown fine grained poorly graded sand.		6		20
			Continued on page 2.				

DRILLING LOG (Cont Sheet)		ELEVATION TOP OF HOLE		Hole No. <b>B-108</b>		
PROJECT		INSTALLATION		SHEET <b>2</b>		
<b>TEMP</b>		<b>Ft. Bragg, NC</b>		OF <b>2</b> SHEETS		
ELEVATION	DEPTH ft.	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
	10		Cleaned out with auger		Jar	Blows/Ft.
	12					
	13.5		SM Tan fine silty sand.		7	
	14		SP Tan fine to medium grained poorly graded sand.		8	
	15		Bottom of Hole @ 15.0 ft.			23

Section: APPENDIX A		Hole No. W912HN-07-	
DIVISION		SAD	
PROJECT		Ft. Bragg, NC	
LOCATION (Coordinates or Station)		SIZE AND TYPE OF BIT 1 3/8" ID SPT; 4" Auger	
DRILLING AGENCY		DATUM FOR ELEVATION SHOWN TBM or MSL	
HOLE NO. (As shown on drawing title and file number)		MANUFACTURER'S DESIGNATION OF DRILL	
NAME OF DRILLER		Failing 1500 Holemaster	
DIRECTION OF HOLE		TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	
<input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.		DISTURBED 6 UNDISTURBED 0	
THICKNESS OF OVERBURDEN		TOTAL NUMBER CORE BOXES	
DEPTH DRILLED INTO ROCK		ELEVATION GROUND WATER	
TOTAL DEPTH OF HOLE		DATE HOLE	
15.0 Ft. 0.0 Ft. 15.0 Ft.		STARTED 19 Feb 2010 COMPLETED 19 Feb 2010	
		ELEVATION TOP OF HOLE	
		TOTAL CORE RECOVERY FOR BORING	
		SIGNATURE OF INSPECTOR	
		281.0 N/A Ted Zilander, Geologist	

ELEVATION a	ft. DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	Blows/Ft. h
	0		Topsoil, 0.4 ft.		Jar		
			SP Brown and gray fine to medium grained poorly graded sand w/silt layers.		1		13
	2		Cleaned out with auger		2		4
			SP Light brown fine grained poorly graded sand.		3		8
	4		With rock fragments.		4		8
			Cleaned out with auger		5		
	6		SP Tan fine to medium grained poorly graded sand.				
			Cleaned out with auger				
	8		SM Tan fine to medium grained silty sand.				
	10		Continued on page 2.				



DRILLING LOG (Cont Sheet)		ELEVATION TOP OF HOLE		Hole No. <b>B-109</b>		
PROJECT		INSTALLATION		SHEET <b>2</b> OF <b>2</b> SHEETS		
TEMP <b>ft.</b>		<b>Ft. Bragg, NC</b>				
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	% CORE RECOVERY	BOX OR SAMPLE NO.	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant)
	10		Cleaned out with auger.		Jar	Blows/Ft.
	12					
	13.5					
	14		SP Tan and light gray poorly graded sand.		6	
	15		Bottom of Hole @ 15.0 Ft.			37

DRILLING LOG		DIVISION <b>SAD</b>	INSTALLATION <b>Ft. Bragg, NC</b>	SHEET OF 1 SHEETS
1. PROJECT <b>TEMP</b>			10. SIZE AND TYPE OF BIT <b>1 3/8" ID SPT, 4" Auger</b>	
2. LOCATION (Coordinates or Station)			11. DATUM FOR ELEVATION SHOWN (BM or MSL)	
3. DRILLING AGENCY <b>SAS</b>			12. MANUFACTURER'S DESIGNATION OF DRILL <b>Failing 1500 Holemaster</b>	
4. HOLE NO. (As shown on drawing title and file number) <b>B-110</b>			13. TOTAL NO. OF OVER- BURDEN SAMPLES TAKEN : <b>5</b> : UNDISTURBED : <b>0</b>	
5. NAME OF DRILLER <b>D. Hewett</b>			14. TOTAL NUMBER CORE BOXES <b>N/A</b>	
6. DIRECTION OF HOLE <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED _____ DEG. FROM VERT.			15. ELEVATION GROUND WATER	
7. THICKNESS OF OVERBURDEN <b>10.0 Ft.</b>			16. DATE HOLE : STARTED : <b>23 Feb 2010</b> : COMPLETED : <b>23 Feb 2010</b>	
8. DEPTH DRILLED INTO ROCK <b>0.0 Ft.</b>			17. ELEVATION TOP OF HOLE <b>285.0</b>	
9. TOTAL DEPTH OF HOLE <b>10.0 Ft.</b>			18. TOTAL CORE RECOVERY FOR BORING <b>N/A</b> %	
			19. SIGNATURE OF INSPECTOR <b>Kudjichko, Geologist</b>	

ELEVATION o	DEPTH 0 ft. b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVER- ERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	Blows/Ft. h
			SM Tan and brown fine to medium silty sand w/rock frags.		1		35
			SP Tan fine to medium poorly graded sand.		2	NOTE: Cleaned out hole to 2.0 ft.	12
	5		Clean out with auger		3		6
			SM Tan fine to medium silty sand w/clay.		4		12
	10		SM Tan fine to coarse silty sand.		5	NOTE: Cleaned out hole to 8.5 ft.	42
			Bottom of Hole @ 10.0 ft.				

# **APPENDIX B**

## **List of Drawings**



## Ft. Bragg, BRIGADE COMPLEX - TEMF PN64342

01.CAL	G-001	1	COVER SHEET AND INDEX OF DRAWINGS
02.CAL	GI101	2	LOCATION PLAN
03.CAL	GI102	3	CIVIL LEGENDS
04.CAL	GI103	4	KEY SITE PLAN
05.CAL	H-101	5	BUILDING A-3229 ASBESTOS INSPECTION RESULTS
06.CAL	H-102	6	BUILDING A-3527 ASBESTOS INSPECTION RESULTS
07.CAL	H-103	7	BUILDING A-3726 ASBESTOS INSPECTION RESULTS
08.CAL	H-104	8	BUILDING A-3728 ASBESTOS INSPECTION RESULTS
09.CAL	H-105	9	BUILDING A-3732 ASBESTOS INSPECTION RESULTS
10.CAL	H-106	10	BUILDING A-3734 ASBESTOS INSPECTION RESULTS
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13.CAL	CD101	13	DEMOLITION PLAN "A"
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18.CAL	CS101	18	LAYOUT PLAN "A"
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23.CAL	ES001	23	EXTERIOR ELECTRICAL LEGEND
24.CAL	ES101	24	EXTERIOR COMMUNICATIONS
25.CAL	ES102	25	EXTERIOR COMMUNICATIONS
26.CAL	ES103	26	EXTERIOR COMMUNICATIONS
27.CAL	ES104	27	EXTERIOR COMMUNICATIONS
28.CAL	ES105	28	EXTERIOR COMMUNICATIONS
29.CAL	ES601	29	COMMUNICATIONS ONE LINE DIAGRAM
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# **APPENDIX C**

## **UTILITY CONNECTIONS**

## FORT BRAGG, NORTH CAROLINA UTILITY CONNECTIONS

Updated 10 May 2010

### A. SITE ELECTRICAL GENERAL REQUIREMENTS

1. Site coordination meetings shall be held at the start of design and when necessary thereafter. Meetings shall include all applicable parties including the installation Directorate of Public Works (DPW), Network Enterprise Center (NEC), the privatized electric utility company, the local cable television (CATV) company, the Design-Build Contractor and the Contracting Officer's Representative (COR). All design, demolition and construction work including schedules, capacities, equipment selection, equipment locations, utility routing, connection points and final connection responsibilities shall be addressed.
2. All coordination including exchanges of information between the Design-Build Contractor and the installation DPW, NEC, the privatized electric utility company, the local CATV company information and other utility entities shall be routed through the COR unless otherwise directed.
3. All electrical systems shall comply with the Installation Design Guide for a Sustainable Fort Bragg (<http://www.bragg.army.mil/dpw/idg/>) unless otherwise indicated. Requirements mandated by this RFP or mandated by criteria referenced by this RFP shall supersede the requirements of the Fort Bragg Installation Design Guide. Criteria such as Army Technical Manuals (TMs) referenced by the Fort Bragg Installation Design Guide but not referenced by this RFP shall not be regarded as mandatory.
4. All requirements within this appendix apply to the design and construction whether specifically referenced in section 01 10 00 or not.

### B. ELECTRICAL PRIMARY DISTRIBUTION

1. The existing primary power distribution system at Fort Bragg is a 12470/7200 volts, three-phase, four-wire, grounded wye system. The primary distribution system is owned, managed, and maintained by a privatized electric utility company.
2. The primary distribution system to and within the project site shall be provided by the electric utility company and shall be a loop feed underground system where possible, and shall include primary conductors, ductlines, manholes, switches, sectionalizing cabinets, transformers with concrete pads, grounding, and metering. The electric utility company shall design and construct the primary distribution system in accordance with the Installation Design Guide for a Sustainable Fort Bragg (IDG), IEEE C2 National Electrical Safety Code and the RUS standards. No above ground distribution equipment shall be located within 33 feet of buildings.
3. The privatized electric utility company at Fort Bragg is Sandhills Utility Services (SUS). The point of contact is Jeff Brown, 910-497-7399 x236, [jeffbrown@sandhillsutility.com](mailto:jeffbrown@sandhillsutility.com). All work

done by the electric utility company shall be under a separate contract with the Government. This work is NOT part of this RFP.

4. The Design-Build Contractor shall develop a schedule with the electric utility company concerning transformer delivery times and any offsite utility upgrade projects required to provide power to this project. All schedules shall be coordinated to insure that all projects are completed without compromising the Beneficial Occupancy Date. The Design-Build Contractor shall furnish demand load data to the privatized utility and the COR in a timely manner to facilitate transformer procurement.

5. The privatized electric utility company shall demolish existing exterior primary lines and equipment no longer required on the project site(s).

6. Outages on the existing systems shall be scheduled for off peak times (nights and weekends) and shall be approved by DPW. A minimum of 2 weeks advance notification of outage shall be given. Full preparation shall be done before the outage to minimize the downtime duration.

#### C. ELECTRICAL SECONDARY DISTRIBUTION

1. The Design-Build Contractor shall be responsible for installing secondary service ductlines to the secondary compartment of the transformer. Secondary service ductlines shall be direct-burial, thick wall type except concrete encasement shall be provided in areas subject to vehicular traffic. Transitions from below-grade to above-grade shall be galvanized rigid steel. Fittings for steel conduit shall be steel threaded or compression type. Secondary service ductlines shall include one spare duct sized to match the filled ducts.

2. The Design-Build Contractor shall be responsible for installing secondary service cable from the building service equipment to the secondary compartment of the transformer. The cables shall be of sufficient length to facilitate their connection to the secondary lugs of the transformer. Installation of the cable terminators and connection to the transformer shall be done by the electric utility company. The Design-Build Contractor shall coordinate transformer sizes and locations and shall obtain transformer impedances from the privatized electric utility company to perform electrical calculations.

3. The Design-Build Contractor shall provide a 1-inch conduit from the electric utility meter to a data collection point located in a DDC panel inside the building mechanical room. In addition provide CAT 6 cable from the communications room to the building point of connection (BPOC) located in a DDC Control panel in the building mechanical room. Coordinate locations with the Ft. Bragg UMCS manager.

#### D. SITE LIGHTING

1. Site lighting, defined as all exterior lighting outside of the building 5 foot line, is owned and maintained by the privatized electric utility company. Site lighting includes roadway, walkway, parking, physical training (PT) field, sports and area lighting.

2. Site lighting within the project site shall be designed by the Design-Build Contractor. The design shall comply with the recommendations of the Illuminating Engineering Society of North America (IESNA) and shall be based on the standard fixtures of the electric utility company approved for use at Fort Bragg.
3. Site lighting including fixtures, poles, foundations, conduit and wiring shall be procured and installed by the electric utility company. Site lighting circuits shall be fed from utility transformers; no site lighting circuits shall originate within a building.
4. The privatized electric utility company at Fort Bragg is Sandhills Utility Services. The point of contact is Jeff Brown at (910) 497-7399 x236. All work done by the electric utility company shall be under a separate contract with the Government. This work is NOT part of this RFP.
5. The privatized electric utility company shall demolish existing lighting structures and associated site conduit and wiring no longer required on the project site(s).
6. The Design-Build Contractor shall be responsible for the design and construction of exterior lighting mounted on the new buildings. Wall mounted site lighting fixtures shall be the fully shrouded, full cut-off type. Lighting of walkways within 5-feet of the building shall be the responsibility of the Design-Build Contractor.
7. The Design-Build Contractor shall calculate the site lighting power densities and shall demonstrate compliance with the requirements of ASHRAE 90.1. The Design-Build Contractor shall coordinate with the privatized electric utility company to obtain information required to calculate the site lighting power densities.

#### E. SITE COMMUNICATIONS

1. The telecommunications design shall be coordinated with and approved by the Network Enterprise Center (NEC) Quality Assurance Officer prior to construction. The DOIM point of contact is Janet Gresham at (910) 643-2720, email address: [janet.gresham@us.army.mil](mailto:janet.gresham@us.army.mil).
2. The Design-Build Contractor shall design and install the complete outside plant (OSP) telecommunications infrastructure in accordance with the requirements and recommendations of the Technical Criteria for Installation Information Infrastructure Architecture (I3A).
3. All ductlines shall include one duct with two runs of 3-way Maxcell innerduct. Innerducts shall have 24 inches (minimum) of slack in each maintenance hole. Innerducts shall have a 5 foot (minimum) string permanently attached to the maintenance holes.
4. A minimum of 4 weeks advance notification shall be provided by the Design-Build Contractor prior to any demolition of communication lines or equipment. Notice shall be provided to NEC through the COR.

5. A minimum of 48 hours advance notification shall be provided by the Design-Build Contractor prior to installation of communications maintenance holes, communication lines, or equipment. Notice shall be provided to NEC through the COR.

6. For additional requirements, see APPENDIX: Fort Bragg Specific Communications Requirements.

#### F. SITE CABLE TELEVISION (CATV)

1. Time Warner Cable is the local cable television (CATV) company at Fort Bragg. Time Warner Cable shall provide and install service cabling throughout the project site, terminating in the main communications room of each building. The Design-Build Contractor shall coordinate site work and site/facility interfaces with Time Warner Cable.

#### G. CATHODIC PROTECTION SYSTEM

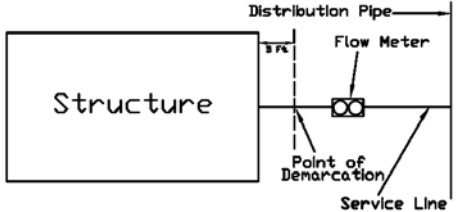
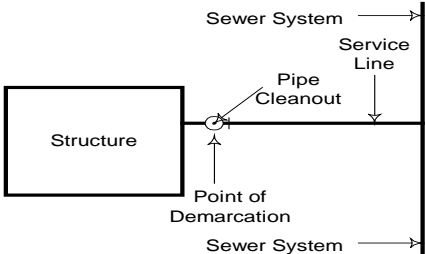
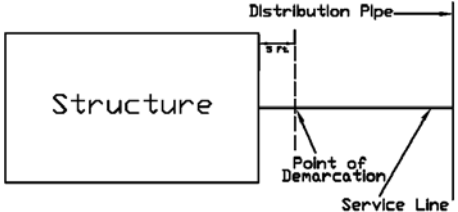
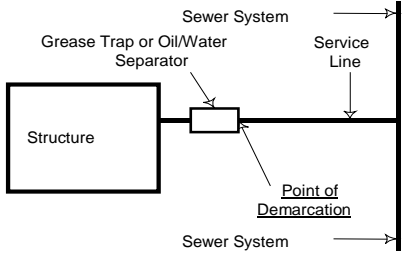
1. The Design-Build Contractor shall design and install a cathodic protection system for all ferrous metal pipes, tanks and equipment in contact with earth. The cathodic protection system shall comply with all applicable Federal, State and local regulations. The Design-Build Contractor shall obtain the services of a person qualified to engage in the practice of corrosion control of buried or submerged metallic surface. Such a person must be accredited or certified by the National Association of Corrosion Engineers (NACE) as a NACE Accredited Corrosion Specialist or a NACE certified Cathodic Protection Specialist, or must be a registered professional engineer with a minimum of five years experience in corrosion control and cathodic protection. The designer shall obtain soil resistivity data on site to assist in determining the cathodic protection requirements.

#### H. Water and Sewer Points of Demarcation

**Wastewater Points of Demarcation** The Fort Bragg wastewater collection system being studied consists of all components from the point where wastewater is collected from individual facilities to the points where the collection system enters the influent diversion box at the wastewater treatment plant. After construction of the new connecting pipeline to the Harnett County wastewater treatment plant, the point of demarcation will be that point where the Fort Bragg collection system enters Harnett County's new lift station. The point of demarcation for each end user is defined as the point or component on the collection system where ownership changes from building owner to the utility owner. In most cases the point of demarcation for the users is the first upstream component (e.g., cleanout) of the system located outside of the facility footprint. **Table 1** identifies the type of service and general location of the point of demarcation with respect to each building served by the collection system.

Table 1.

## Wastewater Collection System, Fort Bragg, North Carolina

Point of Demarcation	Applicable Scenario	Sketch
<p>Point of demarcation is the five-foot line exterior to the building on service line.</p> <p><i>Note: A new cleanout device should be installed at the proximity of 5' from building during any stoppage or maintenance action. The upstream side of the cleanout device will then become the new point of demarcation.</i></p>	<p>Non-residential service. Wastewater system flow meter is located on the service line exiting the structure.</p>	
<p>Point of demarcation is the upstream side of the cleanout device.</p>	<p>Residential and Non-residential service. No flow meter exists and a wastewater system cleanout is located at the proximity of 5' from the building perimeter on the service line exiting the structure.</p>	
<p>Point of demarcation is the five-foot line exterior to the building on service line.</p> <p><i>Note: A new cleanout device should be installed at the proximity of 5' from the building during any stoppage or maintenance action. The upstream side of the cleanout device will then become the new point of demarcation.</i></p>	<p>Residential and Non-residential service. No flow meter or cleanout exists within 25 feet of the building perimeter on the service line exiting the structure.</p>	
<p>Point of demarcation is the downstream side of grease trap or oil/water separator.</p> <p><i>Note: This POD does not apply to grease traps or oil/water separators included as a part of the wastewater system inventory (connected to lift/pump stations).</i></p>	<p>Non-residential service. Grease trap or oil/water separator.</p>	

### 1.1.1 Potable Water Distribution System Fixed Equipment Inventory

The Fort Bragg potable water system consists of all appurtenances extending from the water source to the point of delivery. The system includes, but is not limited to, pumps, pipelines, valves, fire hydrants, post indicating valves, storage facilities, backflow prevention devices, meters, and permanently installed generators dedicated to components of the water system. Water intake and treatment components will remain Government-owned property and will be operated by separate contract until the new purchased-water delivery point is completed. As stated below, these components are excluded from this privatization package.

All water rights will remain with the Government.

Specifically **excluded** from the water distribution system privatization package:

- Non-potable fire protection system, including deluge tanks, pipe, pumps, altitude valves, etc.
- Irrigation systems
- Swimming pool facilities
- Range water wells and small system-dedicated wells
- Wash Rack Facility
- Water Treatment Plant, intake structures, raw water pumps, and high service pumps. Fort Bragg has determined that the best option for future assured supply of potable water is to purchase water from the City of Fayetteville and Harnett County. Negotiations are underway to obtain this potable water supply and the interim, contract operation of the Fort Bragg water treatment plant. After the necessary connections are made for the purchase of potable water, the Fort Bragg water treatment plant will be decommissioned. Therefore, the utility privatization package for the remainder of the potable water system (essentially the distribution network) now excludes the Fort Bragg water treatment plant and high-service pumps.

➤

#### 1.1.1.1 Points of Demarcation

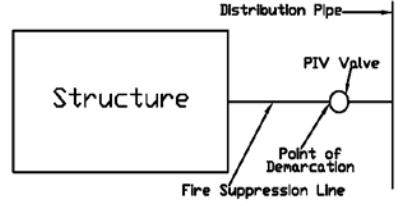
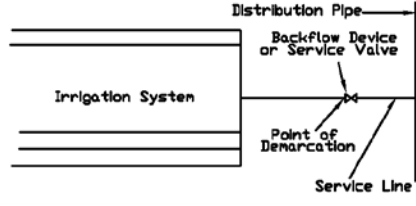
The Fort Bragg potable water distribution system consists of all components from the point where the Post takes ownership from the supplier to the point where water is supplied to end-users. The point of demarcation for each end user is defined as the point or component on the distribution system where ownership changes from the utility owner to the building owner. In most cases, the point of demarcation is the first upstream component (e.g., meter, valve, regulator, etc.) of the system located outside of the facility footprint. However, in situations where the facility water meter is located within the facility, the point of demarcation will be inside the facility and the Contractor will be required to coordinate his work with the facility. The technical library contains a list of facilities where the point of demarcation is located within the facility.

The extreme upstream point of demarcation for the Fort Bragg (before connection to new water supply) will be at that point where the distribution line exits the high-service pumping station at the water plant.

The extreme upstream point of demarcation for the Fort Bragg (after connection to new water supply) will be where the distribution network exits the City/County-owned headworks.



TABLE 2 Points of Demarcation  
*Water Distribution System, Fort Bragg, North Carolina*

Point of Demarcation	Applicable Scenario	Sketch
Point of demarcation is the downstream side of the PIV valve.	Non-residential service. Fire suppression system on dedicated feed from water main.	
Point of demarcation is the downstream side of the backflow prevention device or service valve.	Irrigation system fed directly from distribution system or backflow prevention device exists on the service line entering the structure.	
Point of demarcation is the 5-foot line exterior to building footprint.	Residential service, no shutoff valve exists on the service line entering the structure.	None
Point of demarcation is the downstream side of interior backflow prevention device or water meter (whichever is furthest downstream yet still inside the mechanical room). If the facility has separate feeds for the domestic waterline as well as the fire suppression line, this applies to both lines and both BFD's belong to the successful bidder. If BFD is not present, it goes to the downstream side of the first valve or water meter (whichever is furthest downstream yet still inside the mechanical room).	Non-residential service, appurtenance is located inside the building in a mechanical room.	None.
Point of demarcation will be the downstream side of the first upstream appurtenance from the fixture (valve, backflow device). In some cases these fixtures do not have isolation valves and water can be cut off only with main valves. In these instances, a valve shall be installed that will establish the POD.	Isolated potable water fixtures (outside fountains, yard hydrants, spigots, etc.).	None
Point of demarcation is the downstream side of the altitude valve between water main and storage tank.	Fire booster system with water tank.	None.

Point of Demarcation	Applicable Scenario	Sketch
Point of demarcation is the inlet side of the booster pump.	Fire booster system without water tank.	None.

Table 2 identifies the type of service and general location of the point of demarcation with respect to each building served by the distribution system. There are some water service lines dedicated to exterior fixtures such as drinking fountains, faucets and hose bibs, etc. For these isolated fixtures, PODs will be as described in the previous table.

## I. UNDERGROUND UTILITIES

The classification of existing underground utilities is Mr. Bruce Billings. He can be reached at (910) 907-3564 or at [bruce.billings1@us.army.mil](mailto:bruce.billings1@us.army.mil).

## I. ADDITIONAL POINTS OF CONTACT

- Fort Bragg's Environmental Branch, point-of-contact (POC) Gary Cullen (910-432-8464)
- Natural Gas - Honeywell - The point-of-contact (POC) for information is John Gallagher at 910-436-0440 (cell 910-391-7357).
- Natural Gas – Fort Bragg - POC for Fort Bragg natural gas is Darryl Butler, 910-907-1760

Chilled and Hot Water. Honeywell manages Chilled and Hot Water: Chilled Water (CW), and High Temperature Water (HW) utility services on Fort Bragg. The point-of-contact (POC) for information is John Gallagher.

## **APPENDIX D**

# **FIRE FLOW TEST RESULTS**



# Fire Flow Test with Graph

[www.HoseMonster.com](http://www.HoseMonster.com)

Hydrant ID **A-40 A2530**Street Address **A-2530 Kero St. North side of Bld.**Tested Date **3/30/2010**Tested Time **10:00 AM**

Static Pressure PSI <b>56</b>	Predicted Flow @ 20 <b>2,782</b>	NFPA
Residual Pressure PSI <b>47</b>	Total GPM during flow test <b>1,316</b>	<b>AA Blue</b>

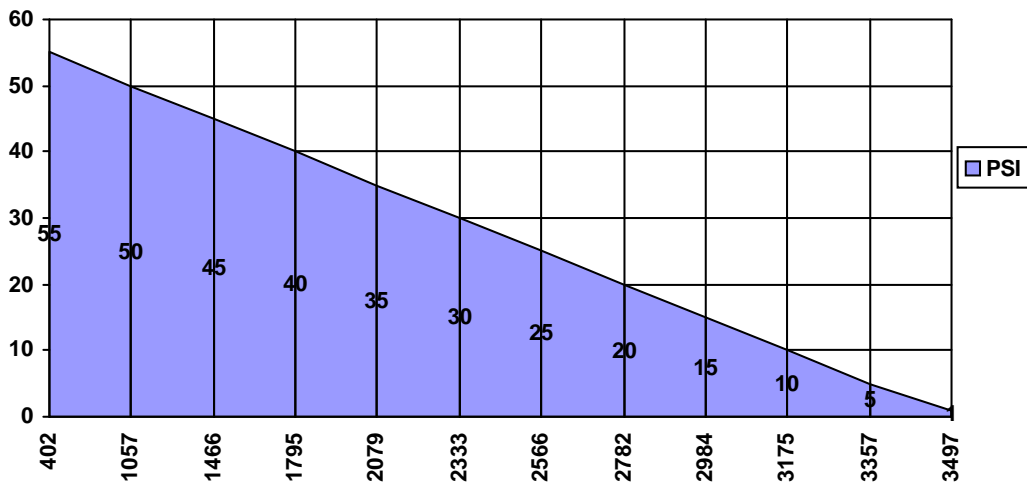
Flow Hydrant **A-21 A3537**  
GPM **658**

Street Address **A-3537 North side of Bldg.**  
Duration **5**

Flow Hydrant **A-24 A3537**  
GPM **658**

Street Address **A3537 Kero st and Keerans ST**  
Duration **5**

Flow



## **APPENDIX E**

### **Environmental Information**



**DEPARTMENT OF THE ARMY  
DIRECTORATE OF PUBLIC WORKS  
US ARMY INSTALLATION MANAGEMENT COMMAND  
HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT BRAGG  
FORT BRAGG, NORTH CAROLINA 28310**

**RECORD OF ENVIRONMENTAL CONSIDERATION  
Project Title: 3rd Brigade Combat Team (BCT) Complex  
Tactical Equipment Maintenance Facility (TEMF)**

**Project Number (PN): 64342 (Part 2 of 2)**

1. BRIEF DESCRIPTION: The proposed project will demolish seven buildings (Buildings A-3527, A-3726, A-3728, A-3732, A-3734, A-3736, and A-3229) and construct a TEMF with a 35,290 square foot (sf) vehicle maintenance shop; 445 sf open storage; an 1,800 sf unmanned aerial vehicle maintenance facility; 42,650 total sf of organizational storage buildings; 36,413 sf organizational vehicle parking; a 600 sf petroleum, oil, and lubricant building; and a 600 sf hazardous materials storage building. The proposed project also includes widening Spooner Street from two to three lanes, constructing a bio-retention pond, expanding the Airborne Mile approximately 2,400 linear feet, and all associated infrastructure for the 3rd BCT TEMF as part of PN 64342. The TEMF project site is between Butner and Longstreet Roads near the intersection of Taylor and Keerans Streets, Fort Bragg, North Carolina (NC) (see Enclosure).

Additional construction will occur under PN 64342 in support of the 3rd BCT Complex. Analysis of the remaining proposed action was completed under separate analysis (*3rd BCT In-Processing Facility and 3rd Brigade Headquarters: PN 64342 (Part 1)*). The separate environmental analysis was reviewed by the Staff Judge Advocate's Office and subsequently signed by the Director of Public Works on May 24, 2010.

2. ANTICIPATED DATE AND/OR DURATION OF PROPOSED ACTION: The proposed project is anticipated to occur in FY 10.

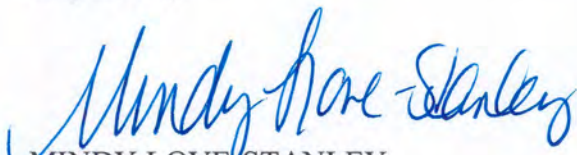
3. REASON FOR USING A RECORD OF ENVIRONMENTAL CONSIDERATION: The proposed facility is adequately covered in the Environmental Assessment (EA) entitled *Implementation of BRAC 2005 Base Realignment and Army Modular Force Transformation Actions (BRAC) dated January 24, 2007*. The EA and Finding of No Significant Impact (FNSI) may be reviewed at the Department of Public Works, Environmental Management Branch Office, Building 3-1137, Fort Bragg, NC 28310. The EA concluded that constructing the new TEMF will not have an adverse effect or impact on any resource areas at Fort Bragg. The proposed TEMF project site falls within the area analyzed in the BRAC EA. The demolition of the buildings was anticipated in the environmental assessment, as well as the possibility of asbestos containing building materials (ACBM) and lead based paint in those structures. The test results on Buildings A-3527, A-3726, A-3728, A-3732, A-3734, A-3736, are positive for ACBM. Building A-3229 tested negative for ACBM. The program manager will ensure all asbestos related work is conducted by NC accredited personnel. All abated friable and non-friable ACBM shall be disposed of at the Fort Bragg landfill on Lamont Road and shall be disposed of in accordance with all federal, state, and local regulations. Copies of the



applications, permits, and any revisions must be provided to the Fort Bragg Asbestos Program Manager. The project manager will include a "use only non-asbestos containing material" clause in all scopes of work or specifications for new construction, additions, or renovations. All painted and stained surfaces in the building are presumed to contain lead. All lead paint waste generated must be manifested and sent to an alternate disposal site. Contact the Fort Bragg Hazardous Waste Program Manager for guidance (Building 3-1137) prior to disposal of this waste. The construction of the TEMF will result in no additional impact on the environment. No additional consultations or permits are required. The conclusions of the *BRAC 2005 EA* are still supported.

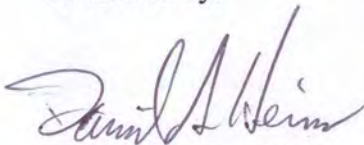
4. CONCLUSIONS: In accordance with 32 CFR § 651.12 (a) (2) the project can be executed without an EA or Environmental Impact Statement because all environmental impacts are adequately covered in an existing EA. The EA was prepared in a manner designed to evaluate the potential environmental impacts of these projects in a programmatic manner. This separate National Environmental Policy Act analysis of the more defined project footprint confirms the FNSI as found in the BRAC EA. No additional consultations or permits were identified or required and it does not impact sensitive resources outside of what was discussed in the EA as verified by the Environmental Staff.

Prepared by:



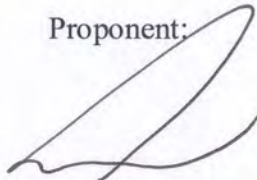
MINDY LOVE-STANLEY  
NEPA Analyst

Reviewed by:



DAVID A. HEINS  
Ch, Environmental Division

Proponent:



GREGORY G. BEAN  
Director of Public Works

Date: 5/28/10



# Tactical Equipment and Maintenance Facility

Demolish 7 Buildings

Project Footprint

Expand Spooner Street

Legend

- Archeological Survey Areas
- RCW Forage Partitions
- Groundwater Monitoring Wells
  - Status
    - Unknown
    - Removed
    - Installed
    - ?
  - Grill Chambers
  - Oil/Water Separators
  - Wash Racks (Old)
- USTs In Place
  - Status/DOH
    - Closed In Place
    - Currently In Use
    - Inactive (Out of Service)
  - USTs Removed (Contaminated) HCDENR
    - Further Action Required
    - Unknown
  - Status
    - Ins

0 65130 260 390 520 Feet

Title: Tactical Equipment and Maintenance Facility  
PN: 64342 (Part 2 of 2)  
Prepared By: Mindy Love-Stanley  
Prepared Date: May 18, 2010

# **ARCHITECTURAL THEME AND COLOR SCHEME AND PHOTOS OF SITE AND SURROUNDING BUILDINGS**

## **ARCHITECTURAL THEME**

There are fundamental principles of design that provide the framework for sustainable, sound, safe and visually and spatially attractive development. The design of facilities inside and out must be done in a way that is personal and inviting - what we call "human scale".

The design principles are to be used throughout the installation because of their association with human scale that creates a sense of ownership. Ownership and sense of belonging is the foundation upon which the residents will ultimately support our sustainable installation.

The principles require the designer to reflect the existing architecture and built environment. They are applicable to every building, group of buildings and details of buildings and spaces around buildings. Buildings are tied to one another (by matching roof slopes, colors, materials, style of building and detailing). Spaces between and around buildings are made positive (by treating these outdoor spaces as if they had walls with thought being given to making the space a place worth spending time in or accentuating the function as a transition space). Further, the spaces between buildings form links between buildings, e.g., the design of the pedestrian paths related to the human in terms of width, material and visual texture. The combined effect of considering the scale of the outdoor spaces with the size of buildings leads the designer to select a hierarchy of details reflecting the importance of structures and spaces.

These Principles along with the Predominant Materials and Colors give the more creative designers a frame of reference and a well defined kit of parts as a basis of design.

Common architectural elements of design such as color, texture, roof lines and detailing create unity within a district. These design elements complement and work in harmony with one another to establish a visually compatible and integrated environment. The creation of a unifying design is a key element in the establishment and maintenance of individual identities for post-wide visual districts.

Buildings, space and structures come to life with the application of colors and textures. Color and texture may be applied in many ways. A more coarse texture of material with the same color can actually change the hue of the color. Simple boldness of design depends on the degree of contrast between material colors and textures. Too many colors or textures can create ambiguity in the design and may result in a district color scheme that is not unified.

## COLOR SCHEME

The purpose of this section is to identify the range of colors to be used throughout the Post. A unification of design will be achieved by limiting this choice of colors and materials, and yet the range of choices is sufficient to allow for variety. This section will discuss specific design criteria for various materials. It is not the purpose of this section to discuss the applicability of the various materials for the different visual districts. Where colors are listed by a specific manufacturer, other equal materials with identical colors from other manufacturers are acceptable.

(5 DIGIT NUMBER REFERS TO FEDERAL STANDARD 595B PAINT COLORS.

The first digit refers to the finish of the paint i.e. 2 = semi-gloss, 3 = flat.

Colors may appear in tables with any first digit.

Viewable at [www.chassis-plans.com/paint\\_fed-std-595.html](http://www.chassis-plans.com/paint_fed-std-595.html) )

MATERIAL	COLOR	MANUFACTURERS REFERENCES	FED. STD. NO.
, 6 Roofing	Red Y j kg	Shingles, "Tile Red Blend"	-----
	Red Y j kg	Metal Roofing, No manufacturer reference	<del>20109</del>
		Fascia	24084
	Dark Bronze	Gutters and downspouts	24084
	Dark Bronze		24084
Stucco Systems and Painted walls (to include wood and CMU)		No manufacturer reference	23617
Trim (Paint)	Dark Bronze	No manufacturer reference	24084
Masonry		No manufacturer reference	23617
Brick	Red common	No manufacturer reference	-----
Vertical Metal Siding		No manufacturer reference	23617
Trim for	Dark Bronze	No manufacturer reference	24084

Vertical metal  
siding

Aluminum  
Windows

Dark Bronze

No Manufacturer reference

24084

Window glazing

Solar Grey

No Manufacturer reference

-----

Handrails  
attached to  
building

Dark Bronze

No Manufacturer reference

24084

Handrails  
Free standing

Mission  
Brown

No Manufacturer reference

20059

Entrance  
awnings

Mission  
brown

No Manufacturer reference

20059

Pedestrian  
lighting

Dark Bronze

No Manufacturer reference

24084





A

Bldg 3434—existing TEMF



B

Wash Rack—to be demolished



C

Bldg 4638—To be demolished



A Taylor at Spooner—looking NE



B Taylor at Gruber—looking N



C Butner at Russel—looking SE

APPENDIX G  
GIS Data

Not Used



## **Appendix H**

### **Exterior Signage**

## 2.2.6 Signage

Signs are used to visually communicate information and are a highly visible feature of the installation. Careful consideration must be given to their appearance and relation to the surroundings. Signs should be an attractive and harmonious part of the visual environment. The creation of a coordinated signage system will enhance Fort Bragg's visual image and improve the efficiency of movement.



Signage Reflects the Importance of the Activity Relative to the Installation

A sign system must communicate information effectively and efficiently. It must present a sequence and hierarchy of information that is logical and responsive to user needs. The system should provide a sense of consistency and continuity to the installation's overall visual image. It must be designed to be adaptable, compatible and integrated into the design of other site features.

The following criteria provides recommendations for the design and location of all signs at Fort Bragg. Signs not in compliance with these guidelines are not permitted unless approved by the DPW.

### 2.2.6.1 General Provisions

This section regulates all exterior signs and interior signs positioned for exterior observance. Signs should be used only as necessary. Redundant, unreadable, and outdated signs should be moved.

DPW approval is required prior to installing, painting, remodeling, relocating, or expanding any sign. No approval is required to perform normal maintenance and repair of a conforming sign or to change a message on a sign or marquee specifically designed for this purpose.

Other general sign provisions include the following:

- Public safety signs not exceeding two square feet do not require site approval. Examples include emergency telephone, restroom, and underground utilities.
- Street signs, not located in state rights-of-ways, do not require site approval.
- Signs placed for less than 30 days do not require site approval. These shall be removed by those placing them.
- Signs conforming to previous regulations, but not conforming to this guide, will be removed and replaced.
- Nonconforming signs shall not be enlarged, repaired, reconstructed, changed, including wording or graphics changes, except to comply.
- Signs not specifically outlined in this IDG are not authorized unless approved by the Garrison Commander. Examples include signs identifying S1, S2, S3, S4, classroom, motor pool, etc.
- Signs itemized in this section shall be placed at the appropriate buildings regardless of its real property category, unless specified otherwise.



Simplified Signs are Easy to Read

- No signs shall interfere with or confuse traffic or other aspects of safe driving conditions through use of improper wording, graphics, location, size, shape, or color. No sign shall use the words "Stop", "Go", "Caution", "Yield", etc., when such would be confused with traffic signs or devices.

### 2.2.6.2 Sign Details

The following details shall apply to all signs at Fort Bragg:

- All signs will either be pre-manufactured from materials meeting or exceeding the EPA required minimum recycled content or fabricated by DPW. Low quality and "homemade" signs are prohibited.
- Any sign that is mechanically animated (i.e., revolves, rotates, or moves in any way) is prohibited.
- Signs will be brown Federal Specification Color Number 20059 and white (i.e., Park Service colors).



Acceptable Symbology Commonly used as Signage Graphics

- Locate signs where they are visible and unobstructed.
- Signs will not indicate building numbers, hours of operation, or names of individuals (commander, first sergeant, OIC, manager, etc.).
- Sign wording shall be brief and limited to essential information. Words may be abbreviated if the message remains easily understood.
- Commercial symbols are allowed only on MWR signs.
- Unit Insignias and logos are not allowed on signs.
- Signs generally are not landscaped; however, if ornamental planting occurs in the vicinity of the sign, locate the sign in the planting bed.
- Temporary signs do not require landscaping; changeable signs are not considered temporary.
- Any exposed lighting tubes, strings of lights, spotlights, or any illumination that causes direct glare upon an unrelated building are prohibited.
- Any flashing signs, traveling lights, or signs animated by lights of changing degrees of intensity or color are prohibited.
- Signs may be lit by remote lamps or backlit where nighttime identification is required such as at clubs, shopping areas, and post entry points.



Caution should be used when Locating Signs to Avoid Obstructed Views

- Internally lit signs must have an opaque message surface displayed at all times, and at no period will views be allowed to the inside of the sign regardless of whether a message is on the sign or not.
- Use of neon is allowed for entertainment/food-type uses. Approval is required by DPW.
- Typically, signs are single-sided if parallel to traffic flow. Signs that cannot be located parallel to the direction of traffic may be located perpendicular to traffic.
- Kiosks, informational signs, and “You Are Here” maps are to be centrally located in “Activity Nodes” as defined by the District Plate graphics.
- For military building signs, quantities are limited to one of each type allowed.
- For MWR Building signs, facilities shall use no more than two of the specified signs.
- Quantities are limited regardless of whether facilities are located on corners, have exposure to multiple roads/drives, or have building entrances visually separated from roads/parking lots.
- All signs, except as mentioned below, use Helvetica.
- Sign Types C, D and E Series use Clarendon medium.
- Traffic signs will follow guidelines in the Federal Highway Administration’s “Standard Alphabets for Highway Signs and Pavement Markings” standards.



Planting Beds can be Utilized to Accentuate Signage

ABCDEFGHIJKLMNOPQRSTUVWXYZ  
 OPQRSTUVWXYZ

Use Helvetica Type Style Unless an Approved Alternative is Noted

ABCDEFGHIJKLMNOPQRSTUVWXYZ  
 OPQRSTUVWXYZ  
 abcdefghijklmn  
 opqrstuvwxyz

Clarendon - The Alternative Type Style

### 2.2.6.3 Sign Mounting and Location

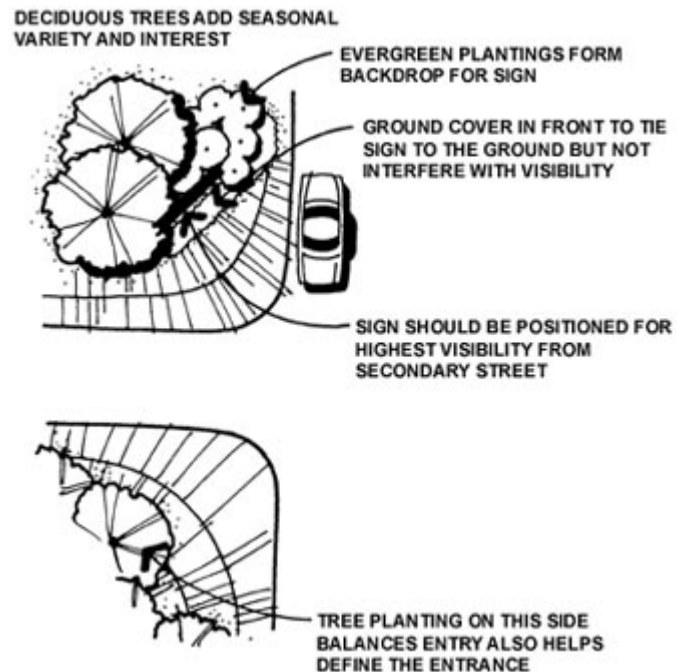
Locate identification signs typically at building entrances and/or other parts of the building visible from the main access street. Building signs should be visible from the main circulation paths to the building (vehicular or pedestrian).

Place building and/or facility identification signs within the first 20 percent of the distance closest to the road between the road and the building. These signs shall be placed so as not to obscure any other identification, information or vehicular regulatory signs.

Signs that cannot be located parallel to the direction of traffic may be located perpendicular to traffic.

The minimum distance between sign and driveway or intersection should normally be 100 feet. One identification sign for each building is sufficient unless vehicular access occurs on two or more sides of the building.

Provide signs to identify facilities dedicated to or accessible to the handicapped, such as parking spaces, building entrances, and restroom facilities.



Consider Basic Planning and Design Objectives in Sign Placement

### Mounting Signs on Buildings

When signs are mounted on buildings, the following requirements shall apply:

- No sign may be mounted on the outside of the door, except small signs (one square foot or less) that indicate required use of an alternate entrance.
- Signs such as "Escort Required" or changeable signs are not permitted.
- No sign may be attached or mounted to roofs and parapets.
- No sign shall be painted or applied directly onto the surface of a building.
- No permanent signs shall obstruct any window, door, fire escape, ladder, or opening intended for light, air, or egress.
- No temporary sign in windows or glass walls is allowed to cover more than 20 percent of the glass area.
- No signs shall interrupt the vertical and horizontal features of the facade.
- No sign may be tacked, posted, painted, or otherwise affixed to site elements such as sheds, trees, or structures.
- No sign may be attached to utility poles except for pole identification or warning.
- Fasten projecting signs directly to the supporting building wall and integrate the frame into the sign. These signs shall intersect at right angles to the building front and shall not extend above the roof line or the parapet wall.
- Signs may not project more than five feet from a wall or two-thirds the width of the sidewalk, whichever is less.
- In no case may signs be closer than 18 inches to the curb line. A minimum clear height of 8 feet 6 inches above the ground is required.

### Mounting Multiple Signs



Mount multiple signs on a shared frame when it is necessary to site these signs in the same vicinity. Two Type A Series signs may be stacked vertically on one frame. Three Type A Series may be mounted side by side. Other signs may not ordinarily share a frame unless otherwise described.

#### 2.2.6.4 Sign Descriptions

**Type A1, Medium Metal** - 36-inch by 30-inch metal panel colored brown with 3/4-inch white border and white reflective upper and lower-case letters. The sign is mounted on two metal "U-channel" posts colored brown (Fed. Std. 595B - #20059)

**Type A2, Small Metal** - 12-inch by 18-inch metal panel colored brown with 1/2-inch white border and white reflective letters. The sign is mounted on one metal "U-channel" post, horizontally or vertically.

**Type A3, Small Metal** - 18-inch by 24-inch metal panel colored brown with 1/2-inch white border and white reflective letters. The sign is mounted on one metal "U-channel" post or fence or wall, horizontally or vertically.

**Type B, Large Metal Panel** - 48, 60, or 72-inch by 36-inch metal panel colored brown (Fed. Std. 595B - #20059) with white 3/4-inch border and white reflective upper and lower-case letters. Mount on two pressure treated wooden 4-inch by 4-inch posts.

**Type C, Medium Redwood** - 2-foot 6-inch by 8-foot 6-inch high-density urethane with 2-inch smooth border and sandblasted raised white reflective centered uppercase and lowercase letters. The sign is mounted on 6-inch by 6-inch pressure treated wooden posts, three on each end.

**Type D1, Large Redwood** - 6-foot by 19-foot, 6-inch wide high-density urethane with 2-inch smooth border and sandblasted raised white reflective centered upper and lower case letters. The sign is mounted on 6-inch by 6-inch treated wooden posts, three on each end.

**Type D2, Large Redwood** - 7-foot by 24-foot high-density urethane panel with 3-inch smooth border and sandblasted raised white reflective centered upper and lower case letters. The sign is mounted on ten, 8-inch by 8-inch pressure treated wooden posts, five on each end.

**Type E, Family Housing** - 2-foot - 6-inch by 9-foot 6-inch high-density urethane panel with 2-inch smooth border and sandblasted, raised, white, reflective, centered, upper and lower case letters. The sign is cantilevered from five, 6-inch by 6-inch pressure treated wooden posts.

**Type F1, Building** - 28-inch by 8-inch metal panel colored brown with white reflective letters and no border.

**Type F2, House Number** - 14-inch by 7-inch metal panel colored brown with white reflective letters and no border and mount in vicinity of the front door.

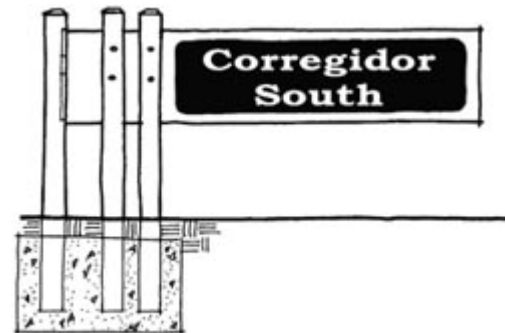
**Type G, Chapel Sign** - 5-foot by 3-foot-6 inches



Type D1, Large Redwood Sign



Type D2, Large Redwood



Type E, Family Housing Sign

synthetic panel colored white with black letters. The chapel name panel is one-foot high, white synthetic, with black letters lit internally. The sign is mounted on two 2 ½ -inch square, metal posts colored brown and capped with a finial.

**Type H1, Large Synthetic** - 10-foot by 6-foot prefabricated synthetic panel with colors complementary to the district colors within which it is placed. The sign is mounted on a brown 10- or 12-inch diameter pole. The overall sign height is limited to 22 feet. This sign may be affixed to a wall or lit internally.

**Type H2, Individual Letter Signs** - These are signs which consist of individual letters mounted directly onto a wall exclusive of any sign surface. Total area of the minimum imaginary rectangle or square of vertical and horizontal lines which fully encloses all sign words or message is ten feet by six-feet. Letters shall be professionally manufactured, reflective metal letters. Letter color shall be of high contrast to its mounting background. Faceted or sloped letter surfaces are optional. Letter style may be either Helvetica or Clarendon depending on the district character.

**Type H3, School Signs** - Variable message board 3-foot by 8-foot with surface mounted text may be used by schools. Sign may be single school color, will be internally lighted and may have a graphic of the school mascot. Mount on red brick base. Top of sign may not be higher than four feet above ground.

**Type I, Variable Message Signs** - Variable message board 4-foot by 8-foot with internal electronic text and graphics shall be brown (20059) on all sides with white letters and may have a graphic of the proponent. Mount on red brick base. Top of sign may not be higher than seven feet above ground.

#### 2.2.6.5 Sign Categories

##### Military Building Signs

Any land use not mentioned below will use a sign that most closely matches one mentioned.

See Sign Description ([Section 2.2.6.4](#)) for sign type descriptions.

• Battalion-Level Commands	Type B
• Brigade/Group Regiment	Type C
• Company/Battery/Detachment	Type A1
• Corps Headquarters	Type D1
• Business Centers	Type C
• Education Centers and Annexes	Type A1
• "G-Level" Staff Sections	Type A1
• Medical and Health Care Facilities	Type C (except small clinics)
• Offices/Activities Frequented by non-Fort Bragg Personnel (e.g., Defense Reutilization & Marketing Office, Central Receiving, I.D. Card Facility)	Type B
• Special Administration Offices Sections (e.g., Personnel Services Center, Enlisted Records, Officer Records, etc.)	Type A1
• Reenlistment Offices	Type A1
• "Flag-Level" Tenant Units	Type C

##### Morale/Recreation Building Signs

Any land use not mentioned below will use a sign that most closely matches one mentioned.

See Sign Description ([Section 2.2.6.4](#)) for sign type descriptions.

• Arts and Crafts	Type A1
• Auto Craft Shop	Type A1
• Automatic Teller Machine	Type A1
• Bakeries	Type H1, H2
• Banks	Type H1, H2
• Barbershop	Type H1, H2
• Bowling Alley	Type H1, H2
• Car Rental	Type H1, H2
• Car Wash	Type H1, H2
• Chapel	Type G
• Child Care Center	Type C
• Clubs in Permanent Buildings	Type C
• Clubs in Temporary Buildings	Type A1
• Commissary	Type H1, H2
• Gas Station	Type H1, H2
• Guest Quarters	Type E
• Laundromat	Type H1, H2
• Library	Type C
• Movie Theater/Playhouse	Type H1, H2
• Museum	Type C
• Rent-All	Type H1, H2
• Restaurant	Type H1, H2
• Schools	Type H3
• Snack Bar/Shop	Type A1
• Telephone Center	Type A1
• Thrift Shop	Type A1
• Youth Center	Type I
Recreation Signs	
• Golf Course	Type C
• Gymnasium/Physical Fitness Center	Type C
• Horse Stable	Type A1
• Motorcycle Track	Type A1
• Parade Field	Type C
• Skating Rink	Type H1, H2
• Sports Field	Type A1
• Stadium	Type A1
• Recreational (All uses not listed)	Type A1



## **Building Numbers Signs**

Use Type F1 for all facilities, temporary and permanent. These signs are required for emergency identification and/or real property management purposes. These also include sports fields, lift stations, shelters, and fuel dispensing buildings.

Excluded from this requirement are family housing units, contractor trailers/buildings, relocatable/port-able structures, utilities, fences and transportation systems such as roads, sidewalks, and railroads.

## **Family Housing Building Numbers**

Use Type F1 for all facilities.

## **Other Signs**

- **Billboards**

Use billboards at parade fields only. Any other sign that directs attention to a business attraction, or entertainment conducted at a location other than the premises where the sign is located, must be combined with other signs of similar character or type and requires specific site and design approval by DPW.

- **Contractor Facilities**

Use Sign Type A1.

- **Directional Signs**

Use these signs only for facilities frequented by non-Fort Bragg personnel. Typical examples, include post exchange, commissary, contracting, hospital, information center, and museum.

These are to be located only on major thoroughfares. Use the Federal Highway Administration's "Standard Alphabets for Highway Signs and Pavement Markings" standards.

- **Historic Facilities**

Upon approval from Cultural Resources historical plaques may be used for any facility properly listed on the State or National Register of Historic Places.

- **Memorialized Facilities**

Upon approval of the Memorialization Board, special facilities may be identified by a Type C sign.

- **Parking Lot Signs**

These signs include handicapped, General Officer, Command Sergeant Major, Mayor, Military Vehicle, Mother with Child, and Visitor spaces. One type A2 for every two spaces.

No reserve parking signs, besides those already mentioned, are allowed for any commanding officer, noncommissioned officer, or executive officer. No "Permit Parking Only" signs are authorized.

- **Portable Signs**

These signs are prohibited. Portable is defined as signs designed to be transported from one location to another, with or without wheels or trailer, and typically have a changeable message area.

- **Residential Business Signs**

These signs are prohibited. Examples include home day-care identification.

- **Restricted Area Signs**

Use Type A2 when authorized by the Provost Marshal. Sign color will be brown 20059.

- Supplemental Building/Structures Signs

These signs are prohibited. Examples include paint or storage shed and kiosk or shelter identification. Safety/Warning signs specifically associated with a supplemental building/structures are allowed.

- Temporary Signs

Signs placed for less than 30 days do not require DPW approval.

- Advertisement/Business Announcement

One sign per location not exceeding 20 square feet. Examples include "Grand Opening", "Under New Management" and similar announcements. Sign display period limited to 30 days and only once per year per vendor.

- Banner

Limited to a maximum of 3-foot by 25-foot fabric material.

Banners mounted on or attached to buildings, structures, and utility poles must have DPW site approval. Sign display period limited to 30 days.

- Construction Signs

One sign per location not exceeding 32 square feet.

- Official Notices, Fairs, and Special Programs

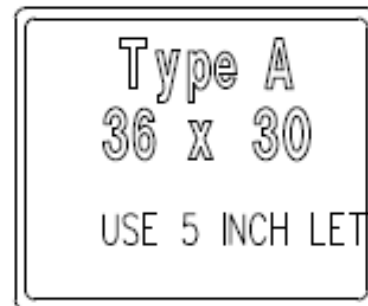
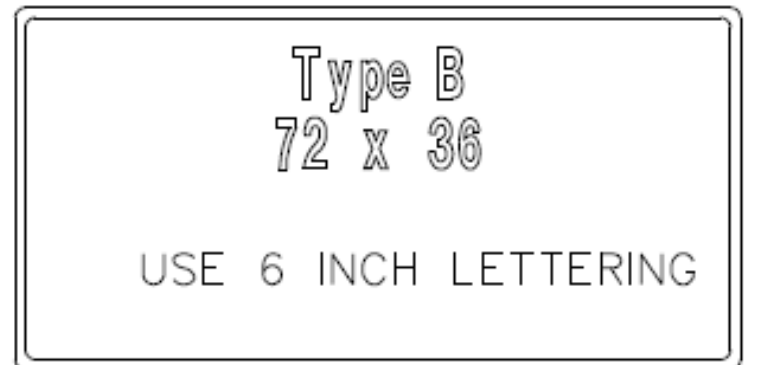
Two per building or location and/or two per intersection. Sign display period limited to 30 days.

- Seasonal Displays

Displays not advertising a product, service, or entertainment require no DPW approval and will be treated as temporary signs.

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METAL PANEL WITH 3M BROWN COATING WITH  
WHITE  $\frac{3}{4}$ " BORDER AND WHITE REFLECTIVE  
UPPER AND LOWER CASE HELVETICA MEDIUM  
LETTERS. MOUNT ON 2) 4 X 4 PRESSURE  
TREATED WOOD POSTS PAINTED BROWN. PAINT  
BACK OF SIGN ALSO



2" RADIUS CORNERS





Text for this project signage shall state:

**82d BSB**

**TEMF**

# **APPENDIX I**

## **ACCEPTABLE PLANTS LIST**

IDG Practical Plantings			Zone		Type		Function				Light			Moisture Level		Bloom Color					Bloom Season				Plant Density		Maintenance Issue			
ID#	Common Name	Scientific Name	Natural	Urban	Historical	Evergreen	Deciduous	Habitat	Shade	Screen	Erosion Control	Full Sun	Part Sun	Shade	Wet	Medium	Dry	White/Green	Red	Purple/Blue	Yellow/Orange	Pink	Spring	Summer	Fall	Winter	Massing	Stand Alone	Yes	No
Tall Trees		>20' Tall																												
TT0	American holly	Ilex opaca	•	•	•	•		•	•	•	•	•	•	•	•	•		•					•		•		•	•		•
TT1	Atlantic white cedar	Chamaecyparis thyoides	•	•	•	•		•	•	•	•	•	•	•	•	•									•		•	•		•
TT2	Darlington oak	Quercus laurifolia	•	•	•	•	•	•	•		•	•	•			•	•						•		•			•	•	
TT3	Live oak	Quercus virginiana	•	•	•	•	•	•	•		•	•	•			•	•						•		•			•	•	
TT4	Longleaf pine	Pinus palustris	•	•	•	•		•	•	•	•	•	•		•	•	•						•		•		•	•		•
TT5	Red maple	Acer rubrum	•	•	•		•	•	•		•	•	•		•				•				•			•		•	•	
TT6	Southern magnolia	Magnolia grandiflora	•	•	•	•		•	•	•	•	•			•	•		•					•		•		•		•	
TT7	Tulip poplar	Liriodendron tulipifera	•	•	•		•	•	•		•	•	•		•	•					•		•		•			•	•	
TT8	White oak	Quercus alba	•	•	•		•	•	•		•	•	•			•	•						•		•		•	•		•
TT9	Willow oak	Quercus phellos		•	•		•	•	•			•	•			•	•						•		•			•	•	
Small Trees		8' to 20' Tall																												
ST0	Chickasaw plum	Prunus angustifolia	•	•	•		•	•	•		•		•				•	•					•			•	•	•		
ST1	Crabapple	Malus angustifolia	•	•			•	•	•		•	•				•	•	•				•	•	•			•	•	•	
ST2	Crepe myrtle*	Lagerstroemia indica			•		•	•	•		•		•				•	•	•	•		•			•			•	•	
ST3	Chokeberry	Sorbus arbutifolia	•	•	•		•	•	•		•		•	•	•	•		•				•	•		•		•	•	•	
ST4	Dogwood	Cornus florida	•	•	•		•	•	•		•		•	•		•	•	•				•	•	•			•	•	•	
ST5	Easter red cedar	Juniperus virginiana	•	•	•	•		•	•	•	•	•	•			•	•						•		•			•	•	
ST6	Persimmon	Diospyros virginiana	•	•	•		•	•	•				•	•		•	•		•		•	•	•	•	•			•	•	
ST7	Redbud	Cercis canadensis	•	•			•	•	•		•	•	•			•	•			•			•				•	•	•	
ST8	Sassafras	Sassafras albidum	•	•	•		•	•				•	•			•	•	•	•			•	•	•			•	•	•	
ST9	Sourwood	Oxydendrum arboreum	•	•	•		•	•	•	•	•		•	•		•	•	•						•	•			•	•	
ST10	Yaupon tree	Ilex vomitoria	•	•	•	•		•	•	•	•	•	•	•	•	•			•				•		•		•	•	•	
Large Shrub		4' to 8' Tall																												
LS0	Camellia*	Camellia japonica		•	•	•		•	•	•	•	•							•			•				•	•	•		•
LS1	Kalmia	Kalmia latifolia	•	•	•	•		•	•		•		•		•	•	•	•					•	•		•		•	•	
LS2	Oakleaf hydrangea	Hydrangea quercifolia	•	•	•		•	•			•			•			•	•									•			•
LS3	Oleander*	Nerium oleander			•	•		•			•																	•		
LS4	Redbay	Persea borbonia	•	•	•	•		•	•	•			•	•	•	•		•						•			•	•	•	
LS5	Rhododendron	Rhododendron spp.	•	•	•	•		•				•	•			•		•				•		•	•			•	•	
LS6	Rose of sharon*	Hibiscus syriacus	•	•	•		•	•				•	•	•				•		•		•		•	•			•		•
LS7	Serviceberry	Amelanchier arborea	•	•	•		•	•	•	•	•							•					•	•			•		•	
LS8	Wax myrtle	Myrica cerifera	•	•	•	•	•	•	•	•	•	•	•		•	•	•						•			•	•	•		•
Medium Shrub		2' to 4' Tall						•			•																			
MS0	Acuba variegated*	Acuba spp.			•	•		•			•		•	•			•	•					•		•			•	•	
MS1	Azalea*	Rhododendron spp.		•	•			•			•			•			•	•	•	•		•	•	•			•			•
MS2	Gardenia*	Gardenia spp.		•	•			•			•			•		•	•	•										•		•
MS3	Mapleleaf viburnum*	Viburnum acerifolium	•	•	•		•	•			•	•	•		•	•		•					•	•				•		•
MS4	Strawberry bush	Euonymus americanus	•	•	•	•	•	•			•				•	•			•		•		•		•			•		•
MS5	Sweet pepperbush	Clethra alnifolia	•	•	•		•				•	•	•		•	•		•						•	•			•	•	
Small Shrub		0' to 2' Tall						•			•																			
SS0	Azalea evergreen*	Rhododendron spp.		•	•	•		•			•		•	•			•					•		•	•			•		•
SS1	Big Hosta*	Hosta lancifolia		•	•		•	•	•				•	•			•										•			•
SS2	Dwarf Gardenia*	Gardenia spp.		•	•	•		•			•		•	•			•	•	•								•			•
SS3	Dwarf Nandina*	Nandina domestica		•	•		•	•		•		•	•			•	•										•			•
SS4	Dwarf Yaupon	Ilex vomitoria 'Nana'	•	•	•	•		•			•	•	•	•	•				•				•		•			•		•
SS5	Hawthorne	Crataegus spp.	•	•	•			•	•	•	•	•	•			•	•	•					•				•			•
SS6	Purple Muhly grass	Muhlenbergia capillaris		•	•		•		•	•	•	•	•			•	•				•						•			•
Groundcover		<1' Tall						•			•																			
GC0	Ajuga*	Ajuga reptans			•	•		•			•		•							•			•				•			•
GC1	Blue fescue*	Festuca ovina `Glauc'		•	•	•		•	•		•	•	•			•	•			•				•			•			•
GC2	Creeping juniper*	Juniperus horizontalis		•	•	•		•			•	•	•			•	•	•						•			•			•
GC3	Dwarf Huckleberry	Gaylussacia dumosa	•	•	•		•	•			•	•	•			•	•	•					•	•			•			•
GC4	Liriope*	Liriope spp.		•	•			•	•				•			•	•	•		•							•			•
GC5	Periwinkle spp.*	Vinca major	•	•	•	•		•			•		•			•	•	•		•		•		•				•		•
GC6	Periwinkle spp.*	Vinca minor			•	•	•	•			•		•			•	•			•				•	•			•		•
GC7	Phlox	Phlox spp.			•	•		•			•		•			•	•	•		•				•	•			•		•
GC8	Well's delight	Vaccinium crassifolium	•	•	•	•		•			•	•	•			•		•					•	•				•		•
GC9	Wintercreeper*	Euonymus fortunei	•	•	•	•		•			•	•	•		•												•			•
GC10	Wiregrass	Aristida stricta	•	•	•	•		•	•	•	•	•	•			•	•				•				•		•			•
	* Non-native plant to Sandhills region; discontinue use of planting by FY 2013.																													
	Last Modified: 4 March 2009																													

<b>Expedient Rain Garden Guide</b>		
	<b>Common Name</b>	<b>Scientific Name</b>
<b>ID#</b>	<b>Tall Trees</b>	<b>&gt;20'</b>
TT01	American Holly	<i>Ilex opaca</i>
TT05	Longleaf Pine	<i>Pinus palustris</i>
TT11	River Birch	<i>Betula Nigra</i>
TT12	Water Oak	<i>Quercus nigra</i>
TT10	Willow Oak	<i>Quercus phellos</i>
<b>ID#</b>	<b>Small Trees</b>	<b>8'-20'</b>
ST12	Bald Cypress	<i>Taxodium distichum</i>
ST03	Chokeberry	<i>Aronia arbutifolia</i>
ST07	Persimmon	<i>Diospyros virginiana</i>
ST08	Redbud	<i>Cercic canadensis</i>
ST13	Silky Dogwood	<i>Cornus amomum</i>
ST11	Yaupon Tree	<i>Ilex vomitoria</i>
<b>ID#</b>	<b>Large Shrubs</b>	<b>4'-8'</b>
LS09	American Beautyberry	<i>Callicarpa americana</i>
LS10	Dense Hypericum	<i>Hypericum densiflorum</i>
LS11	Inkberry	<i>Ilex glabra</i>
LS12	Summersweet Clethra	<i>Clethra alnifolia</i>
LS13	Swamp Titi	<i>Cyrilla racemiflora</i>
LS08	Wax Myrtle	<i>Myrica cerifera</i>
LS14	Witchhazel	<i>Hammamelis spp.</i>
<b>ID#</b>	<b>Medium Shrubs</b>	<b>2'-4'</b>
MS06	Highbush Blueberry	<i>Vaccinium corymbosum</i>
<b>ID#</b>	<b>Small Shrubs</b>	<b>&lt;2'</b>
SS07	Little Bluestem	<i>Andropogon scoparius</i>
SS08	Purple Muhly Grass	<i>Muhlenbergia capillaris</i>
SS09	White False Indigo	<i>Baptisia alba</i>
<b>ID#</b>	<b>Groundcover</b>	<b>&lt;1'</b>
GC12	Black-eyed Susan	<i>Rudbeckia hirta</i>
GC13	Goldenrod	<i>Solidago spp.</i>
GC14	Blazing Star	<i>Liatris spicata</i>
ID# coordinates with Fort Bragg IDG Practical Plantings Guide, as applicable		
Last Modified: 7 August 2009		



<b>Expedient Rain Garden Guide</b>		
	<b>Common Name</b>	<b>Scientific Name</b>
<b>ID#</b>	<b>Tall Trees</b>	<b>&gt;20'</b>
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GC14	Blazing Star	<i>Liatris spicata</i>
ID# coordinates with Fort Bragg IDG Practical Plantings Guide, as applicable		
August 2009		
Last Modified: 7		

**Ft Bragg Seed Specifications by Activity:****Picerne Housing:**Dunn's Mix (25 LB BAG):

Wyatt - Quarles Seed Co., Garner, NC

29.40% KY 31 Tall Fescue

29.40% Gulf Annual Rye Grass

19.60% Wolfpack Tall Fescue

9.80% Boreal Creeping Red Fescue

9.80 Bermuda Grass (Unhulled)

1.00% Inert Matter

Bermuda Grass(50 LB BAG):

Wyatt - Quarles Seed Co., Garner, NC

98% Pure Seed

0.25% Crop Seed

1.70% Inert

Carpet Grass-(Used In Normandy Housing Only, 50 LB Bag):

Kaufman Seeds

Inc, Ashdown, AR

98% Pure Seed

0.50% Weed Seed

0.50% Crop Seed

1.70% Inert

**Range Control / ITAM:**

Temporary seeding:

Rye grain planted in the winter and millet in the summer.

Perennial seeding:

Common Bermuda, Bahaia, and Kobe Lespedeza.

'Green Ranges':

Centipede for reduced mowing.

We typically omit Bahaia when we plant on the firing ranges.

**DPW / Grounds Maintenance Branch:**

Permanent turf:

Bermuda, centipede, zoysia and St Augustine are our only choices of warm season grasses on Fort Bragg. Carpet grass looks good but is not readily available.

**DPW / Water Management Branch:****Permanent Seeding:**

“Cool Season”: planted between 1 September and February 28

50 pounds per acre Soft Red Winter Wheat (*Triticum spelta*). NO RYE GRASS.

25 pounds per acre common Bermuda (*Cynodon dactylon*), hulled

25 pounds per acre common Bermuda (*Cynodon dactylon*), unhulled

“Warm Season”: planted between 1 March and 31 August

50 pounds per acre German (*Setaria italica*) , Brown Top (*Setaria italica*), or Fox Tail Millet (*Brachiaria ramosum*)

50 pounds per acre common Bermuda (*Cynodon dactylon*), hulled

**Temporary Seeding:**

“Cool Season”: planted between 1 September and February 28

120 pounds per acre Soft Red Winter Wheat (*Triticum spelta*)

“Warm Season”: planted between 1 March and 31 August

65 pounds per acre German (*Setaria italica*), Brown Top (*Setaria italica*), or Fox Tail Millet (*Brachiaria ramosum*)

Straw Mulch: 4,000 pounds per acre. The ground should be completely covered with no bare spot larger than a quarter, then tacked with emulsified asphalt. Emulsified asphalt shall be applied at a rate heavy enough that the entire area appears black in color.

**DFMWR / Golf Courses:**

Permanent turf consists of T-419 Bermuda fairways and TifEagle Bermuda greens.

Every other year they overseed with ryegrass during winter.

**DPW/ Riparian Seed Mix**

<u>Common Name</u>	<u>Scientific Name</u>	<u>Percentage Used</u>
Rice Cut Grass	<i>Leersia oryzoides</i>	15
Soft Rush	<i>Juncus effuses</i>	15
Cypress panicgrass	<i>Panicum dichotomum</i> var. <i>dichotomum</i>	50
Switchgrass	<i>Panicum virgatum</i>	20

## **Rain Garden Grasses for Bio Swales**

### **SWITCHGRASS ( PANICUM VIRGATUM )**

A clumping, warm season grass that grows to 7 ft. tall with leaves ¼-½" wide and up to 24" long. Flowers are borne in airy panicles 1 to 2 ft. above the foliage and begin pinkish to reddish and mature to a grayish white color. Foliage turns a beautiful yellow in fall. Holds it's form well throughout the winter and it is also excellent material for fresh and dried arrangements. For zones 5-9.

### **SEDGE GRASS, LITTLE BLUESTEM ( SCHIZACHYRIUM SCOPARIUM VAR. "BLAZE" )**

A deciduous, warm season, clumping grass. Grows 3-5 ft. tall with soft, light green foliage that are somewhat hairy. Bears large fluffy plumes of seedhead that stand out from a distance. Foliage turns an intense color in fall, ranging from pinkish orange to red-purple. Sharp color lasts through winter. Excellent cutflower material for fall color. For zones 3-10.

### **MEADOW FOXTAIL GRASS ( ALOPECURUS PRATENSIS )**

An evergreen grass that is slow spreading and best planted in clumps. The grass is low growing, usually only reaching about 6" tall. The flower stalks however, will grow about 12" above the foliage and is a soft cylindrical panicle that is soft to the touch, thus the name "Foxtail". A good grass for rockgardens. For zones 6-9.

### **WEeping TURKEYFOOT GRASS ( ANDROPOGON )**

Very similar to the Common Turkeyfoot grass, except this one grows only 5-6 ft. tall and has a rather weeping effect due to the large seedheads. This grass grows well in hot spots and is great background for rock gardens. Good filler material. For zones 4-10.

### **INDIANGRASS ( SORGHASTRUM NUTANS )**

One of the most beautiful native grasses. Grows 2-3 ft. tall with medium green foliage in clumps. The flower spikes reach 2-3 ft. above the foliage and are beautiful panicles 1-3 inches wide and up to 12 inches long. They have a soft, delicate, feathery quality that change from bright yellow to bronze as they mature. In fall, the grass turns yellow and then burnt orange. Maintains attractive color and form throughout Winter. A stunning accent grass, and an excellent flower arrangement material. For zones 4-9.

### **REED CANARY GRASS ( PHALARIS ARUNDINACEA )**

A very attractive ornamental grass growing to about 30 inches with very appealing cone. Reed Canary Grass by the Pound.

**WHEATGRASS ( *THINOPYRUM INTERMEDIUM* )**

An easy to grow sod forming grass reaching 3 ft. tall with long wheat-like seed heads that are easier to use as filler than actual wheat. For zones 4-9.

**WILD WHEAT ( *TRITICUM AESTIVUM* )**

Popular filler material for arrangements, also makes a very attractive background grass with its huge attractive seed heads ( edible ). Grows to about 3 ft. tall and matures to a deep golden color as Fall approaches. For zone 3-9.

**FOXTAIL MILLET.( *SETARIA MACROCHEATA* )**

This is an eye catching ornamental grass reaching 36" tall with pale green or bronzed, bristled seed heads reaching 3-6" long. Lends a tapestry like effect to dried arrangements. Excellent material for fresh or dried arrangements. For zones 3-10.

## **APPENDIX J**

**DRAWINGS PROVIDED UNDER  
SEPARATE COVER**

# **APPENDIX K**

## **UTILITY COST INFORMATION**

# Appendix K

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## Utility Data for Life Cycle Cost Analysis (BLCC) December 2009

The following utility rates reflect Fort Bragg's FY2009 costs. The utility costs are strictly for the commodity costs. No capital cost for infrastructure improvements or distribution expenses are included. In applying the energy costs to the BLCC, the NIST escalation rates should be applied.

**Electricity:** Fort Bragg purchases power from Progress Energy under an experimental real-time tariff (RTP-LGS-TOU-14). There is a baseline purchase (approximately 90% of the total demand). The additional power is purchased on a real-time basis. Anyone dealing with active energy management such as thermal storage or demand management should contact the DPW Energy Group.

**The 2009 electricity blended rate→ \$.0616/kWh<sup>1</sup>**

The prices vary according to the balance of supply and demand in the system. The RTP prices range from \$.035/kWh in the spring and fall to \$.90/kWh during summer peaks. During the summer there is usually a significant difference between on-peak (10AM-10PM) and off-peak hours. The historic averages for the summer (May-September) are \$.05/kWh off-peak and \$.09/kWh on-peak. The rest of the year is \$.04/kWh off-peak and \$.055/kWh on-peak.

**Natural Gas:** Fort Bragg purchases firm transport gas and it is delivered by Piedmont Natural Gas. Prices fluctuate monthly with the market.

**The 2009 natural gas average burner tip rate→ \$7.19/MMBtu**

**Water→ \$1.1441/kgal**

**Sewage→ \$0.7433/kgal**

**District Heating System - Medium Temperature Hot Water→ \$9.00/MMBtu** (Indexed on natural gas prices)

**District Cooling System - Chilled Water→ \$.042/tonh** (Indexed on electricity prices)

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<sup>1</sup> Based on Progress Electric main electric bill, which represents more than 94% of the Cantonment consumption



**APPENDIX L****LEED Project Credit Guidance (OCT 09)****Fort Bragg**

This spreadsheet indicates Army required credits, Army Preferred credits, project-specific ranking of individual preferences, assuming guidance for individual credits, and preferences to related language in the RFP for individual credits.

	LEED Credit Paragraph		Army Guidance: Required - Preferred - Avoid	Project Preference Ranking: (1=most preferred, blank=no preference), X = preferences not applicable to this credit, Rqd=required	
		LEED Project Credit Guidance			
PAR		FEATURE			REMARKS
<b><u>SUSTAINABLE SITES</u></b>					
SSPR1		Construction Activity Pollution Prevention (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met.
SS1		Site Selection		X	See paragraph LEED CREDITS COORDINATION.

SS2	Development Density & Community Connectivity - OPTION 1 DENSITY		X	See paragraph LEED CREDITS COORDINATION
	Development Density & Community Connectivity - OPTION 2 CONNECTIVITY		X	See paragraph LEED CREDITS COORDINATION
SS3	Brownfield Redevelopment		X	See paragraph LEED CREDITS COORDINATION
SS4.1	Alternative Transportation: Public Transportation Access	Pref	X	See paragraph LEED CREDITS COORDINATION
SS4.2	Alternative Transportation: Bicycle Storage & Changing Rooms	Pref	2	Assume that non-transient building occupants are NOT housed on Post unless indicated otherwise.
SS4.3	Alternative Transportation: Low Emitting & Fuel Efficient Vehicles - OPTION 1			Requires provision of vehicles, which cannot be purchased with construction funds. Assume Government will not provide vehicles unless indicated otherwise. Assume that 50% of GOV fleet is NOT alternative fuel vehicles unless indicated otherwise.
SS4.3	Alternative Transportation: Low Emitting & Fuel Efficient Vehicles - OPTION 2	Pref		
SS4.3	Alternative Transportation: Low Emitting & Fuel Efficient Vehicles - OPTION 3			Requires provision of vehicle refueling stations. Installation must support type of fuel and commit to maintaining/supporting refueling stations.
SS4.4	Alternative Transportation: Parking Capacity	Pref		
SS5.1	Site Development: Protect or Restore Habitat			

SS5.2	Site Development: Maximize Open Space	Pref		Assume AGMBC option for aggregated open space at another location on the installation is not available to the project unless indicated otherwise.
SS6.1	Stormwater Design: Quantity Control	Pref	2	See paragraph STORMWATER MANAGEMENT.
SS6.2	Stormwater Design: Quality Control		2	See paragraph STORMWATER MANAGEMENT.
SS7.1	Heat Island Effect: Non-Roof			
SS7.2	Heat Island Effect: Roof	Pref	2	Coordinate with nearby airfield requirements, which may preclude this credit.
SS8	Light Pollution Reduction	Pref		
<b><u>WATER EFFICIENCY</u></b>				
WEPR1	Water Use Reduction (Version 3 only)	Rqd	Rqd	All LEED prerequisites are required to be met.
WE1.1	Water Efficient Landscaping: Reduce by 50%	Pref	1	See paragraph IRRIGATION. Project must include landscaping to be legible for this credit.
WE1.2	Water Efficient Landscaping: No Potable Water Use or No Irrigation	Pref	2	Project must include landscaping to be legible for this credit.
WE2	Innovative Wastewater Technologies - OPTION 1		1	
WE2	Innovative Wastewater Technologies - OPTION 2			
WE3	Water Use Reduction	Pref	2	See paragraph BUILDING WATER USE REDUCTION.

<b>ENERGY AND ATMOSPHERE</b>				
EAPR1	Fundamental Commissioning of the Building Energy Systems (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met.
EAPR2	Minimum Energy Performance (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met.
EAPR3	Fundamental Refrigerant Management (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met.
EA1	Optimize Energy Performance	Rqd	1*	Earning of LEED EA1 points as indicated in paragraph ENERGY CONSERVATION, as a minimum, is required. * <b>Maximization of this is Fort Bragg most preferred credit.</b>
EA2.1	On-Site Renewable Energy	Pref		See paragraph ENERGY CONSERVATION.
EA3	Enhanced Commissioning	*4 Rqd		The Commissioning Authority may be provided through the Design-Build Contractor only if in accordance with USGBC Credit Interpretation Ruling (CIR) dated 9/15/06. Commissioning Authority activities begin during design phase and continue well beyond beneficial occupancy. Assume Government will not provide CxA post-occupancy activities unless indicated otherwise.
EA4	Enhanced Refrigerant Management			
EA5	Measurement & Verification		1	Assume Government will not provide post-occupancy activities unless indicated otherwise.
EA6	Green Power		X	See paragraph LEED CREDITS COORDINATION

<b><u>MATERIALS AND RESOURCES</u></b>				
MRPR1	Storage & Collection of Recyclables (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met. Coordinate with Installation during design development on collection service and receptacles.
MR1	Building Reuse			
MR2.1	Construction Waste Management: Divert 50% From Disposal	Pref		See paragraph CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT.
MR2.2	Construction Waste Management: Divert 75% From Disposal	Pref	2	
MR3	Materials Reuse			
MR4.1	Recycled Content: 10% (post-consumer + 1/2 pre-consumer)	Pref	1	See paragraph RECYCLED CONTENT.
MR4.2	Recycled Content: 20% (post-consumer + 1/2 pre-consumer)	Pref	2	
MR5.1	Regional Materials:10% Extracted, Processed & Manufactured Regionally		1	
MR5.2	Regional Materials:20% Extracted, Processed & Manufactured Regionally		2	

MR6	Rapidly Renewable Materials	Pref		See paragraph BIOBASED AND ENVIRONMENTALLY PREFERABLE MATERIALS and paragraph FEDERAL BIOBASED PRODUCTS PREFERRED PROCUREMENT MATERIALS.
MR7	Certified Wood	Pref		See paragraph BIOBASED AND ENVIRONMENTALLY PREFERABLE MATERIALS.
<b>INDOOR ENVIRONMENTAL QUALITY</b>				
EQPR1	Minimum IAQ Performance (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met.
EQPR2	Environmental Tobacco Smoke (ETS) Control (PREREQUISITE)	Rqd	Rqd	All LEED prerequisites are required to be met. Assume all buildings are smoke free unless indicated otherwise (family housing, barracks and other lodging are facility types where smoking may not be permitted in some cases).
EQ1	Outdoor Air Delivery Monitoring		3	
EQ2	Increased Ventilation			
EQ3.1	Construction IAQ Management Plan: During Construction	Pref	3	See paragraph CONSTRUCTION IAQ MANAGEMENT.
EQ3.2	Construction IAQ Management Plan: Before Occupancy	Pref	3	See paragraph CONSTRUCTION IAQ MANAGEMENT
EQ4.1	Low Emitting Materials: Adhesives & Sealants	Pref	4	See paragraph LOW-EMITTING MATERIALS.
EQ4.2	Low Emitting Materials: Paints & Coatings	Pref	4	See paragraph LOW-EMITTING MATERIALS.
EQ4.3	Low Emitting Materials: Carpet Systems	Pref	4	See paragraph LOW-EMITTING MATERIALS.
EQ4.4	Low Emitting Materials: Composite Wood & Agrifiber Products	Pref	4	See paragraph LOW-EMITTING MATERIALS.

EQ5	Indoor Chemical & Pollutant Source Control	Pref	4	System requiring weekly cleaning to earn this credit is not a permitted option unless indicated otherwise.
EQ6.1	Controllability of Systems: Lighting			
EQ6.2	Controllability of Systems: Thermal Comfort			
EQ7.1	Thermal Comfort: Design	Pref		See paragraph APPLICABLE CRITERIA
EQ7.2	Thermal Comfort: Verification			Project must earn credit EQ7.1 to be legible for this credit. Assume Government will not provide post-occupancy activities unless indicated otherwise.
EQ8.1	Daylight & Views: Daylight 75% of Spaces	Pref	2	See paragraph DAYLIGHTING.
EQ8.2	Daylight & Views: Views for 90% of Spaces	Pref	2	
<b>INNOVATION &amp; DESIGN PROCESS</b>				
IDc1.1	Innovation in Design			See paragraph INNOVATION AND DESIGN CREDITS. Assume Government will not provide any activities associated with ID credits.
IDc1.2	Innovation in Design			
IDc1.3	Innovation in Design			
IDc1.4	Innovation in Design			
IDc2	LEED Accredited Professional	Rqd	Rqd	LEED AP during design and construction is required.
REGIONAL PRIORITY CREDITS (Version 3 only)				See paragraph LEED CREDITS COORDINATION.

06 JAN 2010

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## Owner's Project Requirements Document for LEED Fundamental Commissioning

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Project: Army Standard Design Tactical Equipment Maintenance Facility (TEMF)

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Approved:

\_\_\_\_\_  
Name

\_\_\_\_\_  
Owner's Representative

\_\_\_\_\_  
Date

\_\_\_\_\_  
Name

\_\_\_\_\_  
Design Agent's Representative

\_\_\_\_\_  
Date

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### Overview and Instructions

The purpose of this document is to provide clear and concise documentation of the Owner's goals, expectations and requirements for commissioned systems, and shall be utilized throughout the project delivery and commissioning process to provide an informed baseline and focus for design development and for validating systems' energy and environmental performance.

The Owner's Project Requirements Document is a required document for LEED Version 2.2 EA Prerequisite 1, Fundamental Commissioning of the Building Energy Systems. It shall be completed by the Corps District/Design Agent based on coordination with the Installation/User/Proponent and shall be approved by the Installation/User/Proponent representative.

Use of this template is not required, nor are there any restrictions on editing of it. It is provided simply as a tool to assist project teams in meeting the documentation requirements for LEED Fundamental Commissioning. The intent of the Owner's Project Requirements Document, per the LEED v2.2 Reference Guide, is to detail the functional requirements of a project and the expectations of the building's use and operation as it relates to commissioned systems. This template contains the basic recommended components indicated in the LEED v2.2 Reference Guide. It should be adapted as needed to suit the project, remaining reflective of the LEED intent.

The Owner's Project Requirements Document should ideally be completed before the start of design and furnished to the design team. It must be completed prior to the approval of Contractor submittals of any commissioned equipment or systems to meet LEED requirements.

Updates to the Owner's Project Requirements Document throughout the course of project delivery shall be made by the Corps District/Design Agent based on decisions and agreements coordinated with and agreed to by the Installation/User/Proponent.



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The Owner's Project Requirements Document shall be included in the project's LEED documentation file under EA PR1, Fundamental Commissioning of the Building Energy Systems.

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  - O&M Staff Training and Orientation

TABLE 1

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## 1. **Owner and User Requirements**

What is the primary purpose, program and use of this project? (example: office building with data center)

Tactical equipment maintenance and repair facility.

Describe pertinent project history. (example: standard design development)

Current standard was developed in 2004 and revised in 2006. The intended design is based on standard repair bays and support functions that are based on unit composition, mission, size and equipment.

### **Broad Goals**

What are the broad goals relative to program needs?

To provide economical, standardized facilities that meet the basic functional needs of units.

What are the broad goals relative to future expansion?

Future expansion is not a feature of the TEMF standard.

What are the broad goals relative to flexibility?

The goal is to allow ready adaptability in response to changes in force structure, equipment, and doctrine.

What are the broad goals relative to quality of materials?

Similar to a representative facility of the same type in the private sector. 25-year life with normal maintenance.

What are the broad goals relative to construction costs?

Facility must meet budget.

What are the broad goals relative to operational costs?

Reduce indoor potable water use at least 20%. Reduce outdoor potable water use for irrigation at least 50%. Reduce building energy use at least 30%. Minimize operating costs as much as possible within first cost budget.

Other broad goals: *(Insert as applicable)*

To provide essentially the same functional facility components at all locations (site-adapt) to the extent possible to facilitate unit mobility and to reduce repetitive design costs.

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To reduce construction time to 18 months. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## **2. Environmental and Sustainability Goals**

What are the project goals relative to sustainability and environmental issues? (example: LEED Silver rating)

LEED Silver rating is required. Goal is compliance with all Federal High Performance Sustainable Building requirements for new construction. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

What are the project goals relative to energy efficiency? (example: Meet EPACT)

Reduce energy use at least 30% and strive for greater reduction. Incorporate renewable energy where feasible. Reduce fossil fuel use. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

What are the project goals and requirements for building siting that will impact energy use?

Same facility must be site-adapted worldwide. Consistent building orientation cannot be expected. Variations in availability of fuel sources. Requirement for adjacent hardstand will effect opportunities for shading. \_\_\_\_\_  
Special local requirements are indicated in Paragraph 6 of Statement of Work. \_\_\_\_\_  
\_\_\_\_\_

What are the project goals and requirements for building facade that will impact energy use?

Same facility must be site-adapted worldwide. Exterior appearance will vary to be compatible with adjoining environment's architectural theme. \_\_\_\_\_  
Special local requirements are indicated in Paragraph 6 of Statement of Work. \_\_\_\_\_  
\_\_\_\_\_

What are the project goals and requirements for building fenestration that will impact energy use?

Same facility must be site-adapted worldwide. Antiterrorism/Force Protection criteria (UFC 4-010-01) requires laminated glass and heavy duty frame. Incorporation of daylighting in 75% of spaces used for critical visual tasks. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

What are the project goals and requirements for building envelope that will impact energy use?

Energy use reduction and envelope testing are required. \_\_\_\_\_  
Special local requirements are indicated in Paragraph 6 of Statement of Work. \_\_\_\_\_  
\_\_\_\_\_

What are the project goals and requirements for building roof that will impact energy use?

06 JAN 2010

Special local requirements are indicated in Paragraph 6 of Statement of Work.

Other: *(Insert as applicable)*

### **3. Indoor Environmental Quality Requirements**

What is the intended use for all spaces? For all spaces that have an intended use that is not readily apparent from the space name, provide this information in Table 1.

What is the anticipated occupancy schedule (numbers of occupants and time frames) for all occupied spaces? Indicate the default occupancy schedule below and for all spaces that have an occupancy schedule that differs from the default, provide this information in Table 1.

Typical occupancy schedule is normal business work day. Extended work day and weekend work is anticipated for entire facility during preparation for deployment only.

What accommodations for after-hours use are required? (example: access control, lighting controls, HVAC controls) Indicate general accommodations required below and for all spaces that have special requirements, provide this information in Table 1.

Supervised monitoring of building. IDS at COMSEC vaults, arms vault and SIPRNet room.  
Maintenance and repair areas, office areas have automatic lighting controls with manual override as necessary. Automatic controls shall consist of an automatic time clock and/or occupancy sensors.

What are the lighting, temperature, humidity, air quality, ventilation and filtration requirements for all spaces? Indicate the default requirements below and for all spaces that have a requirement that differs from the default, provide this information in Table 1.

Lighting: IESNA Lighting Handbook, IESNA RP-1-04, ASHRAE 90.1

Temperature: See Table 5-1 in Statement of Work of RFP

Humidity: 50%

Air Quality: ASHRAE 62.1

Ventilation: ASHRAE 62.1

Filtration: \_\_\_\_\_

06 JAN 2010

What are the acoustical requirements for all spaces? Indicate the default acoustical requirements below and for all spaces that have a requirement that differs from the default, provide this information in Table 1.

As indicated in Statement of Work.. \_\_\_\_\_  
\_\_\_\_\_

What is the desired level of occupant ability to adjust systems controls? Indicate the default desired levels below and for all spaces that have a desired level that differs from the default, provide this information in Table 1.

Lighting: IESNA Lighting Handbook, IESNA RP-1-04, ASHRAE 90.1 and as indicated in Statement of Work.

Temperature: None \_\_\_\_\_

Humidity: None \_\_\_\_\_

Air Quality: None \_\_\_\_\_

Ventilation: None \_\_\_\_\_

What, if any, specific types of lighting are desired? (example: fluorescent in 2x2 grid, accent lighting, particular lamps)

As indicated in Statement of Work. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

#### **4. Equipment and System Expectations**

*(Complete for each category as applicable or indicate "none identified" or "N/A". Add desired features information for other anticipated commissioned systems as applicable)*

Indicate desired features for the following commissioned system: Space Heating

Desired Type: Per Statement of Work \_\_\_\_\_

Quality: \_\_\_\_\_

Preferred Manufacturer: \_\_\_\_\_

Reliability: \_\_\_\_\_

Automation: \_\_\_\_\_

Flexibility: \_\_\_\_\_

Maintenance Requirements: \_\_\_\_\_

Efficiency Target: \_\_\_\_\_

Desired Technologies: \_\_\_\_\_

Indicate desired features for the following commissioned system: Ventilation

Desired Type: Per Statement of Work \_\_\_\_\_

Quality: \_\_\_\_\_

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Preferred Manufacturer: \_\_\_\_\_  
Reliability: \_\_\_\_\_  
Automation: \_\_\_\_\_  
Flexibility: \_\_\_\_\_  
Maintenance Requirements: \_\_\_\_\_  
Efficiency Target: \_\_\_\_\_  
Desired Technologies: \_\_\_\_\_

Indicate desired features for the following commissioned system: Air Conditioning

Desired Type: Per Statement of Work \_\_\_\_\_  
Quality: \_\_\_\_\_  
Preferred Manufacturer: \_\_\_\_\_  
Reliability: \_\_\_\_\_  
Automation: \_\_\_\_\_  
Flexibility: \_\_\_\_\_  
Maintenance Requirements: \_\_\_\_\_  
Efficiency Target: \_\_\_\_\_  
Desired Technologies: \_\_\_\_\_

Indicate desired features for the following commissioned system: Refrigeration

Desired Type: Per Statement of Work \_\_\_\_\_  
Quality: \_\_\_\_\_  
Preferred Manufacturer: \_\_\_\_\_  
Reliability: \_\_\_\_\_  
Automation: \_\_\_\_\_  
Flexibility: \_\_\_\_\_  
Maintenance Requirements: \_\_\_\_\_  
Efficiency Target: \_\_\_\_\_  
Desired Technologies: \_\_\_\_\_

Indicate desired features for the following commissioned system: HVAC Controls

Desired Type: Per Statement of Work \_\_\_\_\_  
Quality: \_\_\_\_\_  
Preferred Manufacturer: \_\_\_\_\_  
Reliability: \_\_\_\_\_  
Automation: \_\_\_\_\_

06 JAN 2010

Flexibility: \_\_\_\_\_  
Maintenance Requirements: \_\_\_\_\_  
Efficiency Target: \_\_\_\_\_  
Desired Technologies: \_\_\_\_\_

Indicate desired features for the following commissioned system: Domestic Hot Water

Desired Type: Per Statement of Work \_\_\_\_\_  
Quality: \_\_\_\_\_  
Preferred Manufacturer: \_\_\_\_\_  
Reliability: \_\_\_\_\_  
Automation: \_\_\_\_\_  
Flexibility: \_\_\_\_\_  
Maintenance Requirements: \_\_\_\_\_  
Efficiency Target: \_\_\_\_\_  
Desired Technologies: 30% solar heating \_\_\_\_\_

Indicate desired features for the following commissioned system: Lighting Controls

Desired Type: As indicated in Statement of Work  
Quality: None identified  
Preferred Manufacturer: None identified  
Reliability: None identified  
Automation: As indicated in Statement of Work  
Flexibility: None identified  
Maintenance Requirements: None identified  
Efficiency Target: None identified  
Desired Technologies: As indicated in Statement of Work

Indicate desired features for the following commissioned system: Daylighting Controls

Desired Type: \_\_\_\_\_  
Quality: \_\_\_\_\_  
Preferred Manufacturer: \_\_\_\_\_  
Reliability: \_\_\_\_\_  
Automation: \_\_\_\_\_  
Flexibility: \_\_\_\_\_  
Maintenance Requirements: \_\_\_\_\_  
Efficiency Target: \_\_\_\_\_  
Desired Technologies: \_\_\_\_\_



06 JAN 2010

Indicate desired features for the following commissioned system: Emergency Power

Desired Type: N/A

Quality: \_\_\_\_\_

Preferred Manufacturer: \_\_\_\_\_

Reliability: \_\_\_\_\_

Automation: \_\_\_\_\_

Flexibility: \_\_\_\_\_

Maintenance Requirements: \_\_\_\_\_

Efficiency Target: \_\_\_\_\_

Desired Technologies: \_\_\_\_\_

Indicate desired features for the following commissioned system: Other

Desired Type: \_\_\_\_\_

Quality: \_\_\_\_\_

Preferred Manufacturer: \_\_\_\_\_

Reliability: \_\_\_\_\_

Automation: \_\_\_\_\_

Flexibility: \_\_\_\_\_

Maintenance Requirements: \_\_\_\_\_

Efficiency Target: \_\_\_\_\_

Desired Technologies: \_\_\_\_\_

### **5. Building Occupant and O&M Personnel Requirements**

How will the facility be operated? Who will operate the facility?

Varies. DPW Contractor or staff.

\_\_\_\_\_  
\_\_\_\_\_

Will the facility be connected to an EMCS? If so, what are the interface requirements? (example: monitoring points, control points, scheduling)

Varies. See Statement of Work.

\_\_\_\_\_  
\_\_\_\_\_

What is the desired level of training and orientation for building occupants to understand and use the building systems?

06 JAN 2010

Minimal for occupants. Per RFP.  
\_\_\_\_\_  
\_\_\_\_\_

What is the desired level of training and orientation for O&M staff to understand and maintain the building systems?

As indicated in Section CONSTRUCTION CLOSEOUT and Statement of Work. \_\_\_\_\_  
\_\_\_\_\_

APPENDIX N  
LEED Requirements for Multiple Contractor Combined Projects

Not Used

APPENDIX O  
LEED Strategy Tables

Not Used

## APPENDIX P

### LEED Registration of Army Projects

15 April 2010

#### **Number of Registrations**

Each building must be registered separately, except multiple instances of a standard building on a shared site may be registered as a single project. If a single registration for multiple buildings is chosen, all buildings under the single registration must earn exactly the same points. Do not register buildings that are exempt from a specific LEED achievement requirement.

#### **Typical Registration Procedure**

1. Login, complete the online registration form (see guidance below) at the GBCI LEED Online website <http://www.gbci.org/DisplayPage.aspx?CMSPageID=174> and submit it online.
2. Pay the registration fee via credit card (USACE staff: credit card PR&C is funded by project design or S&A funds).
3. GBCI will follow up with a final invoice, the LEED-online passwords and template information.
4. The individual who registers the project online is, by default, the Project Administrator.

#### **Completing the Registration Form**

##### **BEFORE YOU BEGIN:**

**Create a personal account with USGBC if you do not have one.**

**You will need the following information:**

**Project name as it appears in P2 (obtain from USACE Project Manager)**

**Building number/physical address of project**

**Zip code for Installation/project location**

**Anticipated construction start and end dates**

**Total gross area all non-exempt buildings in registration**

**Total construction cost all non-exempt buildings only (see Project Details Section instructions below)**

##### **ACCOUNT/LOGIN INFORMATION**

1. The person registering the project **must have an account with USGBC** (login and password) to complete the form. Go to <http://www.gbci.org/>, click on "register a project" at the drop-down menu for project certification (at the top of the page) and select "register now for LEED 2009" to start the project registration process. If you have an account, login with your email address and password and select "register new project" to proceed. If you do not have an account, you may select "register a new account" and follow the instructions. It is recommended that you create an account separately on the USGBC website before you start the form. IMPORTANT: USACE team members are members of USGBC and are eligible for Member prices. USACE team members registering projects should be sure to include the USACE Corporate Access ID in their personal account profile (if you do not have it contact [richard.l.schneider@usace.army.mil](mailto:richard.l.schneider@usace.army.mil) or [judith.f.milton@usace.army.mil](mailto:judith.f.milton@usace.army.mil) for the number).
2. The Account/Login Information section is filled out by the person registering the project. It may be a Contractor or a USACE staff member.

##### **ELIGIBILITY SECTION**

Follow directions (accepting the terms and conditions)

Review your profile information and make corrections if needed

##### **RATING SYSTEM SELECTION SECTION**

Select single project registration and I know which rating system.

Select the rating system - currently only LEED-NC and LEED for Homes are approved for Army use without special approval.

LEED Minimum Program Requirements: select YES

**RATING SYSTEM RESULTS SECTION**

Confirm selected rating system.

**PROJECT INFORMATION SECTION**

**Project Title:** Begin the project title with a one-word identifier for the Installation. Do not include the word "Fort". After this match the project name used in P2 (contact the USACE Project Manager for this information) and identify the building being registered. Example: "Stewart 4<sup>th</sup> IBC - DFAC".

**Project Address 1 and 2:** This is the physical location of the project. Provide building number, street address, block number or whatever is known to best describe the location of the project on the Installation.

**Project City:** Installation Name

**State, Country, Zip Code:** Self-explanatory

**Anticipated Construction Start and End Dates:** Self-explanatory – give your best guess if unknown. Note that required data entry format is: 1 or 2 digit month/1 or 2 digit date/4 digit year (example 3/23/2010)

**Gross Square Footage:** Provide total area all buildings in LEED project. Exclude the area of any buildings that are exempt from the LEED achievement requirement (for example, exclude an unconditioned storage shed to be constructed with a barracks complex).

**Is Project Confidential:** Indicate NO except, if project has security sensitivity (elements that are FOUO or higher security), indicate YES.

**Notification of Local Chapter:** Indicate NO unless Government/USACE Project Manager requests you to indicate YES.

**Anticipated Project Type:** Select the most appropriate option from the drop-down menu.

**Anticipated Certification Level:** Select the applicable option from the drop-down menu (Silver is the usual level).

**PROJECT OWNER INFORMATION SECTION**

**Project Owner First Name, Last Name, email, phone, address:** The Project Owner is the USACE Project Manager. Obtain this info from the USACE Project Manager.

**Organization:** U.S. Army Corps of Engineers. This field MUST be completed this way because it will be used as a search field by higher HQ to find all USACE registered projects. You may supplement it with district name at the end but DO NOT revise or use an acronym.

**May we publish Owner information:** Indicate NO

**Owner Type:** Pick Federal Government from drop-down menu.

**Project Owner Assertion:** Check the box

**PAYMENT INFORMATION**

Self-explanatory

**APPENDIX Q**  
**REV 2.1 – 30 SEP 2010**  
**AREA COMPUTATIONS**

**Computation of Areas:** Compute the “gross area” and “net area” of facilities (excluding family housing) in accordance with the following subparagraphs:

**(1) Enclosed Spaces:** The “gross area” is the sum of all floor spaces with an average clear height  $\geq 6'-11"$  (as measured to the underside of the structural system) and having perimeter walls which are  $\geq 4'-11"$ . The area is calculated by measuring to the exterior dimensions of surfaces and walls.

**(2) Half-Scope Spaces:** Areas of the following spaces shall count as one-half scope when calculating “gross area”:

- Balconies
- Porches
- Covered exterior loading platforms or facilities
- **Covered but not enclosed spaces, canopies, training, and assembly areas**
- Covered but not enclosed passageways and walks
- Open stairways (both covered and uncovered)
- Covered ramps
- Interior corridors (Unaccompanied Enlisted Personnel Housing Only)

**(3) Excluded Spaces:** The following spaces shall be excluded from the “gross area” calculation:

- Crawl spaces
- Uncovered exterior loading platforms or facilities
- Exterior insulation applied to existing buildings
- Open courtyards
- Open paved terraces
- Uncovered ramps
- Uncovered stoops
- Utility tunnels and raceways
- Roof overhangs and soffits measuring less than 3'-0" from the exterior face of the building to the fascia

**(4) Net Floor Area:** Where required, “net area” is calculated by measuring the inside clear dimensions from the finish surfaces of walls. If required, overall “assignable net area” is determined by subtracting the following spaces from the “gross area”:

- Basements not suited as office, special mechanical, or storage space
- Elevator shafts and machinery space
- Exterior walls
- Interior partitions
- Mechanical equipment and water supply equipment space
- Permanent corridors and hallways
- Stairs and stair towers
- Janitor closets
- Electrical equipment space
- Electronic/communications equipment space

## APPENDIX R

### Preliminary Submittal Register

#### NOTE TO SPECIFIER:

1. Appendix R" will be a Adobe Acrobat pdf version of the Specifier completed "Sample Preliminary Submittal Register." The Sample Register is Excel Spreadsheet format of the RMS Input Form 4288A, which serves two purposes.
2. First, The Register allows the both Government and the Proposers to see and estimate the cost of the Division 00 and Division 01 submittals required by the contract in addition to the Contractor generated submittal register items developed during Design After Award.
3. Secondly, after award, the Government will provide the Contractor the actual Excel Spreadsheet for the Contractor to input the data into RMS to create the Submittal Register used during contract performance. See Section 01 33 00 (Submittal Procedures), paragraph 1.8 (Submittal Register) for the contract requirements.
4. For the contract or task order Solicitation, the Specifier must complete APPENDIX R, found at the following link:  
<http://rfpwizard.cecer.army.mil/HTML/Docs/Refs/Sample%20Preliminary%20Submittal%20Register.xls> , save it as a PDF file and then upload it into the Wizard as Appendix R.
5. The RMS Input Form initially includes submittals required by the standardized Model RFP Division 00 and Division 01 Sections, except Section 01 10 00, paragraph 3. Examine the Special Contract Requirements, paragraphs 3 and 6 and any other locally developed portions of the RFP for required submittals and add them to the Input Form. Do not duplicate submittals already listed in the standardized RMS Input Form, because the Contractor needs to submit this information only once.
6. After award, the Government provides the Excel spreadsheet to the selected contractor to develop and input the RMS Input form for the submittal register required by paragraph 1.8 of Section 01 33 00, Submittals.



## **APPENDIX AA**

# **ASBESTOS AND HAZARDOUS BUILDING MATERIALS SURVEYS**



**US Army Corps  
of Engineers®**

# **Savannah District Environmental and Materials Unit**

## **Building A-3229 Ft. Bragg, North Carolina**

**Prepared by Timothy A. Jones**



The contents of this report are not to be used for advertising, publication, or promotional purposes. Citation of trade names does not constitute an official endorsement or approval of the use of such commercial products.

The findings of this report are not to be construed as an official Department of the Army position, unless so designated by other authorized documents.

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**Asbestos Survey**

**January 2010**

# **Building A-3229 Fort Bragg, NC**

Prepared by Timothy A. Jones

Final report

**Prepared for    US Army Corps of Engineers  
Savannah District**

# Asbestos Inspection Report

---

## Introduction

### Scope of the Investigation

This report documents the asbestos inspection and survey of Building A-3229 at Fort Bragg, North Carolina conducted on 26 January 2010 by Savannah District US Army Corps of Engineers employee Tim Jones. The survey was conducted in general accordance with the regulatory guidelines in the Asbestos Hazard Emergency Response Act (AHERA) (40 CFR Part 763 Subpart E Sections 763.80-763.88) and “Guidance for Controlling Asbestos-Containing Materials in Buildings” (Purple Book) (EPA publication number 560/5-85-024). Although not required by the AHERA guidelines, roof and other exterior miscellaneous materials were also inspected and sampled.

### Background

Building A-3229 is a 2800 square foot single story steel structure with a bare concrete floor slab. Exterior siding and roof are corrugated metal. The building was reportedly built in 1995 and is currently used as a storage facility.

## Description of study

### Investigation

All accessible areas of Building A-3229 were visually inspected for suspected asbestos containing materials (ACM) by a North Carolina accredited inspector. A copy of the inspector’s accreditation certificate is included in Appendix C. Bulk samples of suspect ACM’s were collected. This report details ACM as identified at the time of inspection only.

The bulk samples were analyzed by Carolina Environmental, Inc. The laboratory is accredited by the National Voluntary Laboratory Accredited Program (NVLAP Accreditation sponsored by the National Institute of Standards and Technology (NIST)). A copy of their accreditation certificates is included in Appendix C. The samples were analyzed by the accepted method of polarized light microscopy (PLM) using EPA’s Method EPA/M4-82-020. The laboratory’s analytical report is included in Appendix A.

In compliance with the AHERA regulations, material is considered an Asbestos Containing Material (ACM) when it contains greater than one percent

asbestos. Likewise, in this report, any material containing concentrations greater than one percent asbestos will be considered “positive”. In some instances, materials containing one percent asbestos, or less, may be assumed to be an asbestos containing material at the discretion of the inspector. A narrative discussion of the AHERA ACM types (i.e., thermal systems insulation, miscellaneous and surfacing materials) found in Building A-3229 is included in this report where relevant. Bulk sample information appears on Table 1. Estimated quantities of individual asbestos containing materials appear on Table 2. Material characterization of asbestos containing materials appears on Table 3. The approximate location where each bulk sample was obtained is shown on the building floor plans, which appear as Figures. Positive ACM samples are highlighted on the floor plan Figures with their numbers enclosed in squares; samples with negative analytical results for asbestos are indicated with their numbers enclosed in circles. Most homogeneous areas are highlighted on the Figures. It is reasonable to assume that all materials similar to those testing positive, also contain positive amounts of asbestos and should be treated as such.

## Conclusions

### Thermal Systems Insulation (TSI)

TSI is insulation material applied to pipes, fittings, tanks, ducts, or for other interior structural components to prevent heat loss or gain, or water condensation, or for other purposes.

No asbestos containing TSI was located in Building A-3229.

### Miscellaneous Materials

Miscellaneous materials include building material on structural components, structural members or fixtures, such as floor and ceiling tiles, and do not include surfacing or TSI. In the past, there were a great number of miscellaneous building materials that had asbestos fibers added to them during the manufacturing process to increase durability and fireproofing qualities. The following suspect miscellaneous materials at Building No. A-3229 were found to contain or are assumed to contain asbestos:

No asbestos containing miscellaneous materials were located in Building A-3229.

### Surfacing

Surfacing material is friable material that is sprayed on, troweled on, or otherwise applied to surfaces for decorative or other purposes.

No asbestos containing surfacing materials were located in Building A-3229.



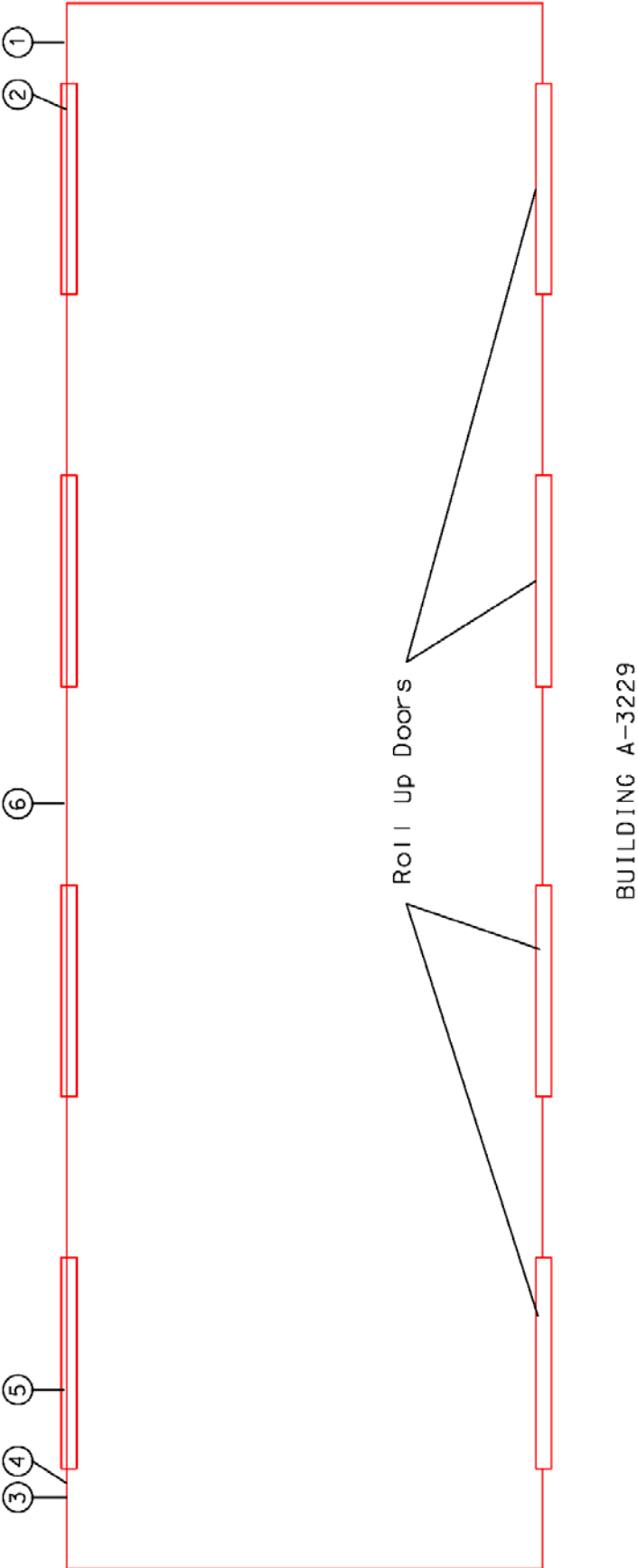
**TABLE 1**  
**SUSPECT ACM SAMPLES**  
**Ft. BRAGG, BUILDING A-3229**

<b>FIELD ID</b>	<b>DESCRIPTION</b>	<b>LOCATION</b>	<b>ASBESTOS TYPE &amp; %</b>
3229-R-1	Caulking material	Roof, between overlapping sections of corrugated metal roofing	No Asbestos Detected
3229-E-2	Caulking material	Exterior, between louver frame and corrugated metal siding	No Asbestos Detected
3229-R-3	Caulking material	Roof, between overlapping sections of corrugated metal roofing	No Asbestos Detected
3229-R-4	Caulking material	Roof, in seams in gutters	No Asbestos Detected
3229-E-5	Caulking material	Exterior, between louver frame and corrugated metal siding	No Asbestos Detected
3229-R-6	Caulking material	Roof, in seams in gutters	No Asbestos Detected

Samples testing positive for asbestos indicated in **BOLD** type

NAD = No Asbestos Detected

Figure 1



# **Appendix A**

## **Analytical Report – Carolina Environmental, Inc.**

CAROLINA ENVIRONMENTAL, INC.  
107 New Edition Court, Cary, NC 27511  
Phone: (919) 481-1413 Fax: (919) 481-1442

## LABORATORY REPORT ASBESTOS BULK ANALYSIS

**Client:** US Army Corps of Engineers - Savannah  
District - EMU9  
200 North Cobb Parkway, Bldg. 400 Ste. 404  
Marietta, GA 30062

**CEI Lab Code:** A10-0687  
**Received:** 02-01-10  
**Analyzed:** 02-03-10  
**Reported:** 02-03-10  
**Analyst:** Gary A. Swanson

**Project:** Ft Bragg Building A-3229; 10178

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION				% ASBESTOS
3229-R-1	A991023	<u>CAULKING</u> Homogeneous, Grey, Fibrous, Bound	CACO 20 %	SYNT 5 %	5 %	ND
			BIND 75 %			
3229-E-2	A991024	<u>CAULKING</u> Homogeneous, Grey, Fibrous, Bound	CACO 20 %	SYNT 5 %	5 %	ND
			BIND 75 %			
3229-R-3	A991025	<u>CAULKING</u> Homogeneous, Grey, Fibrous, Bound	CACO 20 %	SYNT 5 %	5 %	ND
			BIND 75 %			
3229-R-4	A991026	<u>CAULKING</u> Homogeneous, White, Non-fibrous, Bound	CACO 20 %			ND
			BIND 80 %			
3229-E-5	A991027	<u>CAULKING</u> Homogeneous, Grey, Non-fibrous, Bound	SILI 5 %			ND
			BIND 95 %			
3229-R-6	A991028	<u>CAULKING</u> Homogeneous, White, Non-fibrous, Bound	CACO 20 %			ND
			BIND 80 %			

**The following definitions apply to the abbreviations used in the ASBESTOS BULK ANALYSIS REPORT:**

CHRY = Chrysotile	CELL = Cellulose	DEBR = Debris
AMOS = Amosite	FBGL = Fibrous Glass	BIND = Binder
CROC = Crocidolite	CACO = Calcium Carbonate	SILI = Silicates
TREM = Tremolite	SYNT = Synthetics	GRAV = Gravel
ANTH = Anthophyllite	WOLL = Wollastonite	MAST = Mastic
ACTN = Actinolite	CERWL = Ceramic Wool	PLAS = Plaster
N D = None Detected	NTREM = Non-Asbestiform Tremolite	PERL = Perlite
NANTH = Non-Asbestiform Anthophyllite	FBGY = Fibrous Gypsum	RUBR = Rubber
		VER = Vermiculite

---

**CLIENT:** US Army Corps of Engineers - Savannah District - EMU9

**PROJECT:** Ft Bragg Building A-3229; 10178

**CEI LAB CODE:** A10-0687

Stereoscopic microscopy and polarized light microscopy coupled with dispersion staining is the analytical technique used for sample identification. The percentage of each component is visually estimated by volume. These results pertain only to the samples analyzed. The samples were analyzed as submitted by the client and may not be representative of the larger material in question. Unless notified in writing to return samples, Carolina Environmental, Inc. will discard all bulk samples after 30 days.

Many vinyl floor tiles have been manufactured using greater than 1% asbestos. Often the asbestos was milled to a fiber size below the detection limit of polarized light microscopy. Therefore, a "None Detected" (ND) reading on vinyl floor tile does not necessarily exclude the presence of asbestos. Transmission electron microscopy provides a more conclusive form of analysis for vinyl floor tiles.

It is certified by the signature below that Carolina Environmental, Inc. is accredited by the National Voluntary Accreditation Program (NVLAP) for the analysis of asbestos in bulk materials. The accredited test method is EPA / 600 / M4-82 / 020 for the analysis of asbestos in building materials. Procedures described in EPA / 600 / R-93 / 116 have been incorporated where applicable. The detection limit for the method is 0.1% (trace amount). Carolina Environmental, Inc.'s NVLAP accreditation number is #101768-0. This report is not to be used to claim product endorsement by NVLAP or any agency of the U. S. Government. This report and its contents are only valid when reproduced in full. Dust and soil analyses for asbestos using PLM are not covered under NVLAP accreditation.

**ANALYST**



**REVIEWED BY**



Tianbao Bai, Ph.D.  
Laboratory Director

**End of Report**

# **Appendix B**

## **Sample Chain of Custody Forms**

A 10.0687 (6)  
A 991023. A 991028

**ASBESTOS CHAIN OF CUSTODY - US ARMY CORPS OF ENGINEERS**

Project: <b>Ft Bragg Building A-3229</b>	Job No.: <b>10178</b>
Sampler: <b>Tim Jones</b>	Analysis: <b>PLM</b>

[illegible]

Relinquished By	Date	Time	Received By	Date	Time
Tim Jones	1-29-10	1400	Kathy Pull	02/02/10	2:20 PM

--

# **Appendix C**

## **Certifications & Accreditations**





North Carolina Department of Health and Human Services  
Division of Public Health · Epidemiology Section  
Occupational and Environmental Epidemiology Branch  
1912 Mail Service Center · Raleigh, North Carolina 27699-1912  
Tel 919-707-5950 · Fax 919-870-4808

Beverly Eaves Perdue, Governor  
Lanier M. Cansler, Secretary

Jeffrey P. Engel, M.D.  
State Health Director

October 26, 2009

Timothy A Jones  
4411 Smoke Stone Court  
Marietta, GA 30062

Dear Mr. Jones:

Based upon the review of your accreditation application, the Health Hazards Control Unit (HHCU) has determined that you have fulfilled the requirements and are eligible for asbestos accreditation as a(n) INSPECTOR. Your assigned North Carolina accreditation number is 12210, which is reflected on your enclosed North Carolina Accreditation card. Please be sure to take this card with you to any asbestos work site where you are employed. The State requires that all persons conducting asbestos abatement or asbestos management activities be accredited and have their identification card on site.

Your North Carolina Inspector accreditation will expire on SEPTEMBER 30, 2010. It is NOT the policy of the HHCU to issue renewal notices. If you wish to continue working as a(n) Inspector after this expiration date, you must successfully complete the required training and submit a completed application to this office prior to September 30, 2010. If you should continue to perform asbestos management activities as a(n) Inspector without a valid North Carolina accreditation, you will be in violation of State regulations and may be cited for noncompliance.

Sincerely,

A handwritten signature in black ink, appearing to read "Marita E Cheek".

Marita E Cheek  
Accreditation/Certification Secretary  
Health Hazards Control Unit

Enclosure

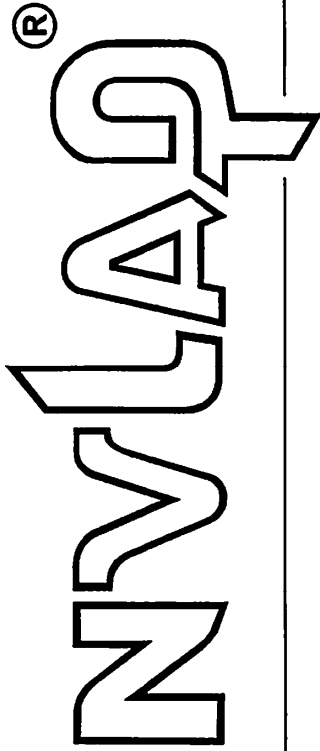


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United States Department of Commerce  
National Institute of Standards and Technology



## Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 101768-0

**Carolina Environmental, Inc.**  
Cary, NC

is accredited by the National Voluntary Laboratory Accreditation Program for specific services,  
listed on the Scope of Accreditation, for:

### BULK ASBESTOS FIBER ANALYSIS

*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.  
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality  
management system (refer to joint ISO-ILAC-IAF Communiqué dated January 2009).*

2009-04-01 through 2010-03-31

Effective dates



*Sally J. Bruce*  
For the National Institute of Standards and Technology

NVLAP-01C (REV. 2009-01-28)



**US Army Corps  
of Engineers®**

**Savannah District  
Environmental and Materials Unit**

*Hazardous Building Materials Survey*

**Building No. A-3229  
Fort Bragg, North Carolina**

Prepared by Timothy A. Jones



The contents of this report are not to be used for advertising, publication, or promotional purposes. Citation of trade names does not constitute an official endorsement or approval of the use of such commercial products.

The findings of this report are not to be construed as an official Department of the Army position, unless so designated by other authorized documents.

**Hazardous Building Materials Survey**

**January 2010**

# **Building No. A-3229 Fort Bragg, North Carolina**

by Timothy A. Jones

Final Report

**Prepared for**

**U.S. Army Corps of Engineers  
Savannah District**

# Hazardous Building Materials Survey Report

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## Introduction

### Background

Building A-3229 is a 2800 square foot single story steel structure with a bare concrete floor slab. Exterior siding and roof are corrugated metal. The building was reportedly built in 1995 and is currently used as a storage facility.

## Description of study

### Investigation

This report documents the hazardous building materials survey of Building No. A-3229 at Fort Bragg, North Carolina conducted on 26 January 2010 by USACE Savannah District employees Tim Jones and Jason Hart and includes only building materials located at the time of inspection. This survey was conducted in general accordance with the Statement of Services for Hazardous Building Material Inspections developed by Ray Willingham, retired, USACE Savannah District. The investigation includes a visual identification and location of such items as: fluorescent and mercury-vapor lights; battery back-up exit lights and emergency lights; mercury-containing thermostats and switches; refrigerant containing air conditioners, water fountains and ice makers; above and below ground storage tanks; transformers; built in chemical type fire suppression systems; smoke detectors; and lead building materials excluding lead based paint. Other hazardous building materials not listed above may also be included at the discretion of the inspectors. Asbestos is excluded from this inspection as it is covered separately in an asbestos inspection report.

## Conclusions

The following information gathered during the survey of Building A-3229 is presented in attached information:

*Light Count:* The fluorescent and mercury vapor light count results are presented in Table 1.

# Tables

**TABLE 1**  
**FORT BRAGG BUILDING A-3229**  
**FLUORESCENT AND MERCURY LIGHT FIXTURES**

AREA IDENTIFICATION	# & TYPE LIGHTS PRESENT	DESCRIPTION OF LIGHTS
Interior	16	4 Bulb, 4 Foot Fluorescent Fixtures



**US Army Corps  
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# **Savannah District Environmental and Materials Unit**

## **Building A-3527 Ft. Bragg, North Carolina**

**Prepared by Timothy A. Jones**





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**Asbestos Survey**

**January 2010**

# **Building A-3527 Fort Bragg, NC**

Prepared by Timothy A. Jones

Final report

**Prepared for   US Army Corps of Engineers  
Savannah District**

# Asbestos Inspection Report

---

## Introduction

### Scope of the Investigation

This report documents the asbestos inspection and survey of Building A-3527 at Fort Bragg, North Carolina conducted on 27 January 2010 by Savannah District US Army Corps of Engineers employee Tim Jones. The survey was conducted in general accordance with the regulatory guidelines in the Asbestos Hazard Emergency Response Act (AHERA) (40 CFR Part 763 Subpart E Sections 763.80-763.88) and “Guidance for Controlling Asbestos-Containing Materials in Buildings” (Purple Book) (EPA publication number 560/5-85-024). Although not required by the AHERA guidelines, roof and other exterior miscellaneous materials were also inspected and sampled.

### Background

Building A-3527 is a 1050 square foot single story wood frame structure with a wood frame floor system topped with vinyl floor tiles. The roof system is asphalt shingles over wood decking. Interior ceilings are a combination of fiberboard and some gypsum drywall. Interior walls are wood framed covered with gypsum drywall. Exterior walls are wood siding covered with newer metal siding. Windows are newer metal replacements. The building was reportedly built in 1958.

## Description of study

### Investigation

All accessible areas of Building A-3527 were visually inspected for suspected asbestos containing materials (ACM) by a North Carolina accredited inspector. A copy of the inspector’s accreditation certificate is included in Appendix C. The restroom of the building was inaccessible at the time of inspection. Bulk samples of suspect ACM’s were collected. This report details ACM as identified at the time of inspection only.

The bulk samples were analyzed by Carolina Environmental, Inc. The laboratory is accredited by the National Voluntary Laboratory Accredited Program (NVLAP Accreditation sponsored by the National Institute of Standards and Technology (NIST)). A copy of their accreditation certificates is included in Appendix C. The samples were analyzed by the accepted method of polarized light microscopy (PLM) using EPA’s Method EPA/M4-82-020. The laboratory’s analytical report is included in Appendix A.

In compliance with the AHERA regulations, material is considered an Asbestos Containing Material (ACM) when it contains greater than one percent asbestos. Likewise, in this report, any material containing concentrations greater than one percent asbestos will be considered “positive”. In some instances, materials containing one percent asbestos, or less, may be assumed to be an asbestos containing material at the discretion of the inspector. A narrative discussion of the AHERA ACM types (i.e., thermal systems insulation, miscellaneous and surfacing materials) found in Building A-3527 is included in this report where relevant. Bulk sample information appears on Table 1. Estimated quantities of individual asbestos containing materials appear on Table 2. Material characterization of asbestos containing materials appears on Table 3. The approximate location where each bulk sample was obtained is shown on the building floor plans, which appear as Figures. Positive ACM samples are highlighted on the floor plan Figures with their numbers enclosed in squares; samples with negative analytical results for asbestos are indicated with their numbers enclosed in circles. Most homogeneous areas are highlighted on the Figures. It is reasonable to assume that all materials similar to those testing positive, also contain positive amounts of asbestos and should be treated as such.

## Conclusions

### Thermal Systems Insulation (TSI)

TSI is insulation material applied to pipes, fittings, tanks, ducts, or for other interior structural components to prevent heat loss or gain, or water condensation, or for other purposes.

No asbestos containing TSI was located in Building A-3527.

### Miscellaneous Materials

Miscellaneous materials include building material on structural components, structural members or fixtures, such as floor and ceiling tiles, and do not include surfacing or TSI. In the past, there were a great number of miscellaneous building materials that had asbestos fibers added to them during the manufacturing process to increase durability and fireproofing qualities. The following suspect miscellaneous materials at Building No. A-3527 were found to contain or are assumed to contain asbestos:

*Floor Tiles & Mastic:* 9” X 9” floor tiles and associated mastic throughout the building contain asbestos. - (Refer to Tables 1, 2 and 3 for specific information and Figure 1 for sample locations).

## **Surfacing**

Surfacing material is friable material that is sprayed on, troweled on, or otherwise applied to surfaces for decorative or other purposes.

No asbestos containing surfacing materials were located in Building A-3527.

**TABLE 1**  
**SUSPECT ACM SAMPLES**  
**Ft. BRAGG, BUILDING A-3527**

<b>FIELD ID</b>	<b>DESCRIPTION</b>	<b>LOCATION</b>	<b>ASBESTOS TYPE &amp; %</b>
3527-R-1	Roof shingle	Roof	No Asbestos Detected
3527-R-2	Roofing felt	Roof, under shingles	No Asbestos Detected
3527-R-3	Roof shingle	Roof	No Asbestos Detected
3527-R-4	Roofing felt	Roof, under shingles	No Asbestos Detected
3527-E-5	Caulking material	Exterior, around door frame at siding	No Asbestos Detected
3527-E-6	Caulking material	Exterior, around door frame at siding	No Asbestos Detected
3527-E-7	Caulking material	Exterior, around window frame at siding	No Asbestos Detected
3527-E-8	Caulking material	Exterior, around window frame at siding	No Asbestos Detected
3527-1-9	Drywall joint compound	Interior partition wall	No Asbestos Detected
<b>3527-1-10</b>	<b>9" X 9" brown floor tile &amp; mastic</b>	<b>Interior</b>	<b>Tile 2% chrysotile, mastic 3% chrysotile</b>
<b>3527-1-11</b>	<b>9" X 9" brown floor tile &amp; mastic</b>	<b>Interior</b>	<b>Tile 2% chrysotile, mastic 3% chrysotile</b>
3527-1-12	Drywall joint compound	Interior perimeter wall	No Asbestos Detected
3527-1-13	Drywall joint compound	Ceiling	No Asbestos Detected
3527-A-14	Gypsum wallboard	Attic, old furnace flue shaft	No Asbestos Detected
3527-1-15	Fiberboard	Ceiling	No Asbestos Detected
3527-1-16	Fiberboard	Ceiling	No Asbestos Detected

Samples testing positive for asbestos indicated in **BOLD** type

NAD = No Asbestos Detected

**TABLE 2**  
**ACM QUANTITY SUMMARY**  
**Ft. BRAGG, BUILDING A-3527**

Homogeneous Area Descriptions	Units	Functional Space Descriptions								
		INTERIOR								Totals
Floor tiles & mastic	S.F.	1050								1050

**S.F. = Square Foot, L.F. = Linear Foot, C.F. = Cubic Foot**

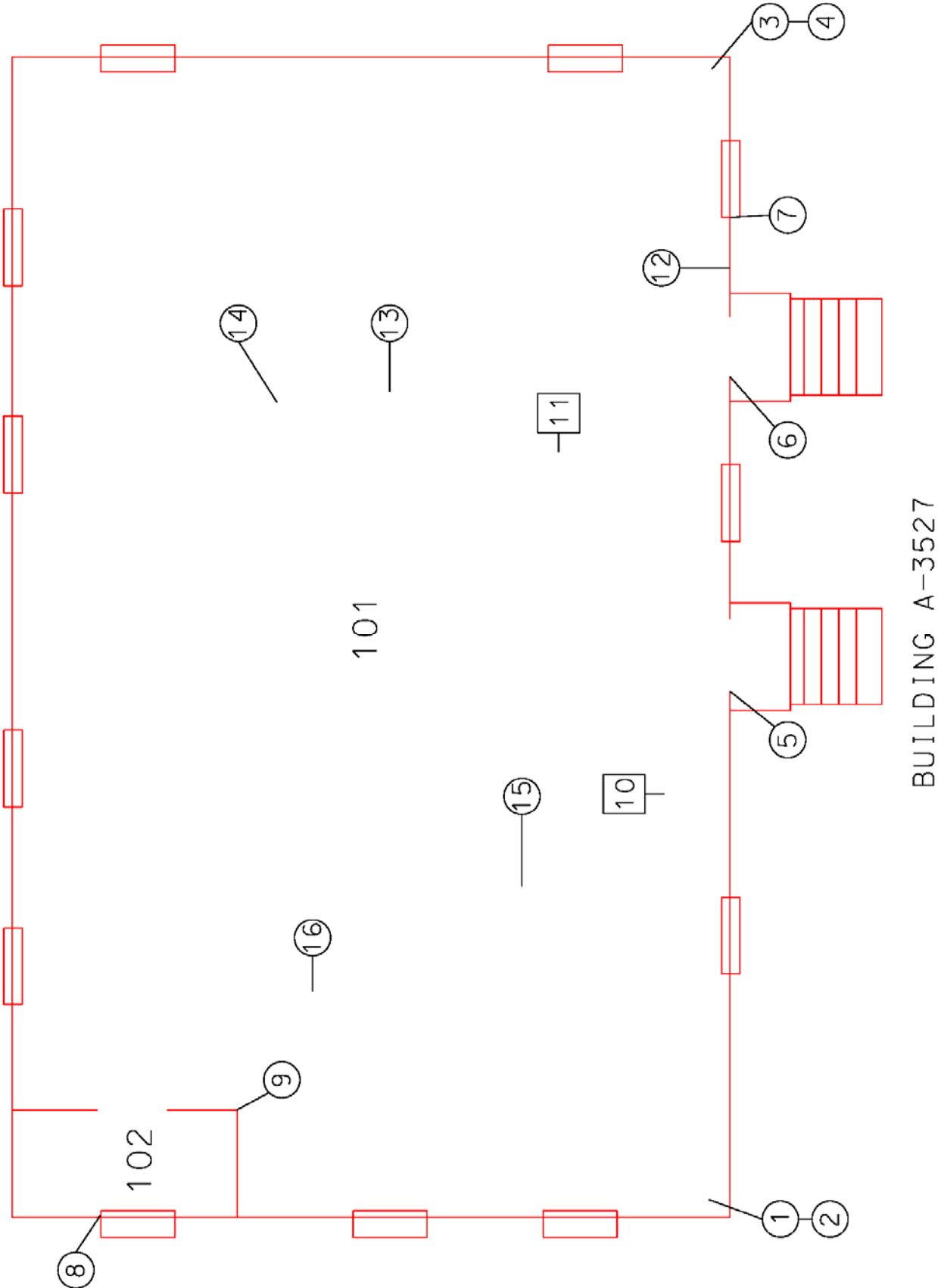
**TABLE 3**  
**MATERIAL CHARACTERIZATION AND ASSESSMENT**  
**Ft. BRAGG, BUILDING A-3527**

MATERIAL		CHARACTERISTICS			ASSESSMENT	
Type	Description	Asbestos Yes/no/assumed	Quantity (If ACM)	Friable / Non- friable	Condition	Disturbance Potential
Miscellaneous	Floor tiles & mastic	Yes	1050	Non-friable	Significantly Damaged	Moderate

**S.F. = Square Foot, L.F. = Linear Foot, C.F. = Cubic Foot**



Figure 1



# **Appendix A**

## **Analytical Report – Carolina Environmental, Inc.**

CAROLINA ENVIRONMENTAL, INC.  
107 New Edition Court, Cary, NC 27511  
Phone: (919) 481-1413 Fax: (919) 481-1442

## LABORATORY REPORT ASBESTOS BULK ANALYSIS

Client: **US Army Corps of Engineers - Savannah**  
**District - EMU9**  
200 North Cobb Parkway, Bldg. 400 Ste. 404  
Marietta, GA 30062

CEI Lab Code: A10-0686  
Received: 02-01-10  
Analyzed: 02-02-10  
Reported: 02-02-10  
Analyst: Lynn Burkholder

Project: Ft Bragg Building A-3527; 10178

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3527-R-1	A991007 Heterogeneous,	<u>ROOF SHINGLE</u> Grey, Fibrous, Bound TAR 60 % FBGL 25 % GRAV 15 %	ND
3527-R-2	A991008 Homogeneous,	<u>ROOFING FELT</u> Black, Fibrous, Bound TAR 20 % CELL 80 %	ND
3527-R-3	A991009 Heterogeneous,	<u>ROOF SHINGLE</u> Black, Fibrous, Bound TAR 60 % FBGL 25 % GRAV 15 %	ND
3527-R-4	A991010 Homogeneous,	<u>ROOFING FELT</u> Black, Fibrous, Bound TAR 20 % CELL 80 %	ND
3527-E-5	A991011 Heterogeneous,	<u>CAULKING</u> Brown, White, Non-fibrous, Bound CAULK 95 % PAINT 5 %	ND
3527-E-6	A991012 Heterogeneous,	<u>CAULKING</u> Brown, White, Non-fibrous, Bound CAULK 95 % PAINT 5 %	ND

CAROLINA ENVIRONMENTAL, INC.  
 107 New Edition Court, Cary, NC 27511  
 Phone: 919-481-1413 Fax: 919-481-1442

Project: Ft Bragg Building A-3527; 10178

Lab Code: A10-0686

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS	
3527-E-7	A991013	<u>CAULKING</u> Heterogeneous, White, Non-fibrous, Bound	ND	
		CAULK 95 % PAINT 5 %		
3527-E-8	A991014	<u>CAULKING</u> Heterogeneous, White, Non-fibrous, Bound	ND	
		CAULK 95 % PAINT 5 %		
3527-1-9	A991015	<u>JOINT COMPOUND</u> Heterogeneous, White, Non-fibrous, Bound	ND	
		CACO 75 % SILI 20 % PAINT 5 %		
3527-1-10	A991016A	<u>FLOOR TILE</u> Homogeneous, Brown, Fibrous, Bound	CHRY	2%
		CHRY 2% VINYL 98 %		
	A991016B	<u>MASTIC</u> Homogeneous, Black, Fibrous, Bound	CHRY	3%
		CHRY 3% MAST 97 %		
3527-1-11	A991017A	<u>FLOOR TILE</u> Homogeneous, Brown, Fibrous, Bound	CHRY	2%
		CHRY 2% VINYL 98 %		
	A991017B	<u>MASTIC</u> Homogeneous, Black, Fibrous, Bound	CHRY	3%
		CHRY 3% MAST 97 %		

CAROLINA ENVIRONMENTAL, INC.  
 107 New Edition Court, Cary, NC 27511  
 Phone: 919-481-1413 Fax: 919-481-1442

Project: Ft Bragg Building A-3527; 10178

Lab Code: A10-0686

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS			
3527-1-12	A991018	<u>DRYWALL/JOINT COMPOUND</u> Heterogeneous, White, Fibrous, Bound	ND			
		GYPSUM 70 %	CELL	20 %		
		BIND 5 %				
		PAINT 5 %				
3527-1-13	A991019	<u>JOINT COMPOUND</u> Heterogeneous, White, Non-fibrous, Bound	ND			
		CACO 75 %				
		SILI 20 %				
		PAINT 5 %				
3527-A-14	A991020	<u>WALLBOARD</u> Heterogeneous, Grey, Fibrous, Bound	ND			
		GYPSUM 75 %	CELL	20 %		
		PAINT 5 %				
3527-1-15	A991021	<u>FIBERBOARD</u> Heterogeneous, White, Fibrous, Bound	ND			
		PAINT 5 %	CELL	95 %		
3527-1-16	A991022	<u>FIBERBOARD</u> Heterogeneous, White, Fibrous, Bound	ND			
		PAINT 5 %	CELL	95 %		

**The following definitions apply to the abbreviations used in the ASBESTOS BULK ANALYSIS REPORT:**

CHRY = Chrysotile	CELL = Cellulose	DEBR = Debris
AMOS = Amosite	FBGL = Fibrous Glass	BIND = Binder
CROC = Crocidolite	CACO = Calcium Carbonate	SILI = Silicates
TREM = Tremolite	SYNT = Synthetics	GRAV = Gravel
ANTH = Anthophyllite	WOLL = Wollastonite	MAST = Mastic
ACTN = Actinolite	CERWL = Ceramic Wool	PLAS = Plaster
N D = None Detected	NTREM = Non-Asbestiform Tremolite	PERL = Perlite
NANTH = Non-Asbestiform Anthophyllite	FBGY = Fibrous Gypsum	RUBR = Rubber
		VER = Vermiculite

**CLIENT:** US Army Corps of Engineers - Savannah District - EMU9

**PROJECT:** Ft Bragg Building A-3527; 10178

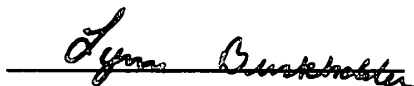
**CEI LAB CODE:** A10-0686

Stereoscopic microscopy and polarized light microscopy coupled with dispersion staining is the analytical technique used for sample identification. The percentage of each component is visually estimated by volume. These results pertain only to the samples analyzed. The samples were analyzed as submitted by the client and may not be representative of the larger material in question. Unless notified in writing to return samples, Carolina Environmental, Inc. will discard all bulk samples after 30 days.

Many vinyl floor tiles have been manufactured using greater than 1% asbestos. Often the asbestos was milled to a fiber size below the detection limit of polarized light microscopy. Therefore, a "None Detected" (ND) reading on vinyl floor tile does not necessarily exclude the presence of asbestos. Transmission electron microscopy provides a more conclusive form of analysis for vinyl floor tiles.

It is certified by the signature below that Carolina Environmental, Inc. is accredited by the National Voluntary Accreditation Program (NVLAP) for the analysis of asbestos in bulk materials. The accredited test method is EPA / 600 / M4-82 / 020 for the analysis of asbestos in building materials. Procedures described in EPA / 600 / R-93 / 116 have been incorporated where applicable. The detection limit for the method is 0.1% (trace amount). Carolina Environmental, Inc.'s NVLAP accreditation number is #101768-0. This report is not to be used to claim product endorsement by NVLAP or any agency of the U. S. Government. This report and its contents are only valid when reproduced in full. Dust and soil analyses for asbestos using PLM are not covered under NVLAP accreditation.

**ANALYST**



**REVIEWED BY**



Tianbao Bai, Ph.D.  
Laboratory Director

**End of Report**

# **Appendix B**

## **Sample Chain of Custody Forms**

A10.0086 (16)  
A991007. A991022

**ASBESTOS CHAIN OF CUSTODY - US ARMY CORPS OF ENGINEERS**

Project: <b>Ft Bragg Building A-3527</b>	Job No.: <b>10178</b>
Sampler: <b>Tim Jones</b>	Analysis: <b>PLM</b>

DATE	FIELD ID	EMU ID	COMPONENTS/NOTES
1/27/2010	3527-R-1	62388	Roof shingle
1/27/2010	3527-R-2	62389	Roofing felt
1/27/2010	3527-R-3	62390	Roof shingle
1/27/2010	3527-R-4	62391	Roofing felt
1/27/2010	3527-E-5	62392	Caulking material
1/27/2010	3527-E-6	62393	Caulking material
1/27/2010	3527-E-7	62394	Caulking material
1/27/2010	3527-E-8	62395	Caulking material
1/27/2010	3527-1-9	62396	Drywall joint compound
1/27/2010	3527-1-10	62397	Floor tile & mastic
1/27/2010	3527-1-11	62398	Floor tile & mastic
1/27/2010	3527-1-12	62399	Drywall joint compound
1/27/2010	3527-1-13	62400	Drywall joint compound
1/27/2010	3527-A-14	62401	Gypsum wallboard
1/27/2010	3527-1-15	62402	Fiberboard
1/27/2010	3527-1-16	62403	Fiberboard

Relinquished By	Date	Time	Received By	Date	Time
<i>Tim Jones</i>	<i>1-29-10</i>	<i>1400</i>	<i>Kurt Rutt</i>	<i>02/01/10</i>	<i>3:20 PM</i>

--



# **Appendix C**

## **Certifications & Accreditations**



North Carolina Department of Health and Human Services  
Division of Public Health · Epidemiology Section  
Occupational and Environmental Epidemiology Branch  
1912 Mail Service Center · Raleigh, North Carolina 27699-1912  
Tel 919-707-5950 · Fax 919-870-4808

Beverly Eaves Perdue, Governor  
Lanier M. Cansler, Secretary

Jeffrey P. Engel, M.D.  
State Health Director

October 26, 2009

Timothy A Jones  
4411 Smoke Stone Court  
Marietta, GA 30062

Dear Mr. Jones:

Based upon the review of your accreditation application, the Health Hazards Control Unit (HHCU) has determined that you have fulfilled the requirements and are eligible for asbestos accreditation as a(n) INSPECTOR. Your assigned North Carolina accreditation number is 12210, which is reflected on your enclosed North Carolina Accreditation card. Please be sure to take this card with you to any asbestos work site where you are employed. The State requires that all persons conducting asbestos abatement or asbestos management activities be accredited and have their identification card on site.

Your North Carolina Inspector accreditation will expire on SEPTEMBER 30, 2010. It is NOT the policy of the HHCU to issue renewal notices. If you wish to continue working as a(n) Inspector after this expiration date, you must successfully complete the required training and submit a completed application to this office prior to September 30, 2010. If you should continue to perform asbestos management activities as a(n) Inspector without a valid North Carolina accreditation, you will be in violation of State regulations and may be cited for noncompliance.

Sincerely,

A handwritten signature in cursive script, appearing to read "Marita E Cheek".

Marita E Cheek  
Accreditation/Certification Secretary  
Health Hazards Control Unit

Enclosure

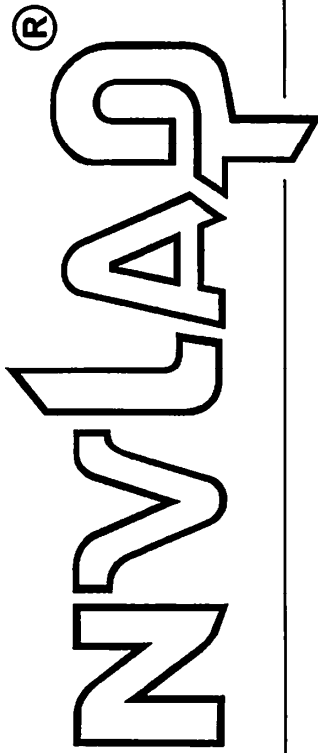


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United States Department of Commerce  
National Institute of Standards and Technology



## Certificate of Accreditation to ISO/IEC 17025:2005

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This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality  
management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).*

2009-04-01 through 2010-03-31

Effective dates



*Sally J. Bruce*  
For the National Institute of Standards and Technology

NVLAP-01C (REV. 2009-01-28)



**US Army Corps  
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# Savannah District Environmental and Materials Unit

## *Hazardous Building Materials Survey*

# Building No. A-3527 Fort Bragg, North Carolina

Prepared by Timothy A. Jones



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**Hazardous Building Materials Survey**

**January 2010**

# **Building No. A-3527 Fort Bragg, North Carolina**

by Timothy A. Jones

Final Report

**Prepared for**

**U.S. Army Corps of Engineers  
Savannah District**

# Hazardous Building Materials Survey Report

---

## Introduction

### Background

Building A-3527 is a 1050 square foot single story wood frame structure with a wood frame floor system topped with vinyl floor tiles. The roof system is asphalt shingles over wood decking. Interior ceilings are a combination of fiberboard and some gypsum drywall. Interior walls are wood framed covered with gypsum drywall. Exterior walls are wood siding covered with newer metal siding. Windows are newer metal replacements. The building was reportedly built in 1958.

## Description of study

### Investigation

This report documents the hazardous building materials survey of Building No. A-3527 at Fort Bragg, North Carolina conducted on 27 January 2010 by USACE Savannah District employees Tim Jones and Jason Hart and includes only building materials located at the time of inspection. This survey was conducted in general accordance with the Statement of Services for Hazardous Building Material Inspections developed by Ray Willingham, retired, USACE Savannah District. The investigation includes a visual identification and location of such items as: fluorescent and mercury-vapor lights; battery back-up exit lights and emergency lights; mercury-containing thermostats and switches; refrigerant containing air conditioners, water fountains and ice makers; above and below ground storage tanks; transformers; built in chemical type fire suppression systems; smoke detectors; and lead building materials excluding lead based paint. Other hazardous building materials not listed above may also be included at the discretion of the inspectors. Asbestos is excluded from this inspection as it is covered separately in an asbestos inspection report.

## Conclusions

The following information gathered during the survey of Building A-3527 is presented in attached information:

- a. Light Count:* The fluorescent and mercury vapor light count results are presented in Table 1.
- b. Lead Building Materials:* Inspection of the building revealed lead in the cast iron plumbing drainage and vent piping system used as pipe joints. Lead flashings are used at the pipe penetrations through the roof. Details are outlined in Table 2.
- c. Above and Below Ground Storage Tanks:* One above ground LP Gas storage tank was located at the front of the building.
- d. Mercury Thermostat:* One Mercury thermostat was found within the building.
- e. Compressed Refrigerant Gas:* One refrigerated drinking fountain was located within the building. This unit is assumed to contain refrigerant gas that should be recovered prior to demolition.



# Tables

**TABLE 1**  
**FORT BRAGG BUILDING A-3527**  
**FLUORESCENT AND MERCURY LIGHT FIXTURES**

<b>AREA IDENTIFICATION</b>	<b># &amp; TYPE LIGHTS PRESENT</b>	<b>DESCRIPTION OF LIGHTS</b>
Interior	4	2 Bulb, 8 Foot Fluorescent Fixtures
Interior	2	Battery backup combination exit/emergency lights
exterior	2	Small mercury lamps

**TABLE 2**  
**FORT BRAGG BUILDING A-3527**  
**LEAD BUILDING COMPONENTS**

<b>BUILDING COMPONENT</b>	<b>DESCRIPTION</b>	<b>LOCATION</b>	<b>ESTIMATED NUMBER</b>
Lead Flashing	Roof flashing	Roof	2
Hot poured lead pipe joint	In plumbing drainage, waste and vent piping	Under the building and in plumbing chase walls	25-35



**US Army Corps  
of Engineers®**

# Savannah District Environmental and Materials Unit

## **Building A-3726 Ft. Bragg, North Carolina**

Prepared by Timothy A. Jones



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The findings of this report are not to be construed as an official Department of the Army position, unless so designated by other authorized documents.

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**Asbestos Survey**

**January 2010**

# **Building A-3726 Fort Bragg, NC**

Prepared by Timothy A. Jones

Final report

**Prepared for    US Army Corps of Engineers  
Savannah District**

# Asbestos Inspection Report

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## Introduction

### Scope of the Investigation

This report documents the asbestos inspection and survey of Building A-3726 at Fort Bragg, North Carolina conducted on 21 January 2010 by Savannah District US Army Corps of Engineers employee Tim Jones. The survey was conducted in general accordance with the regulatory guidelines in the Asbestos Hazard Emergency Response Act (AHERA) (40 CFR Part 763 Subpart E Sections 763.80-763.88) and “Guidance for Controlling Asbestos-Containing Materials in Buildings” (Purple Book) (EPA publication number 560/5-85-024). Although not required by the AHERA guidelines, roof and other exterior miscellaneous materials were also inspected and sampled.

### Background

Building A-3726 is a 2300 square foot single story wood frame structure with a wood frame floor system topped with a combination of vinyl floor tiles and carpet. The roof system is asphalt shingles over wood decking. Interior ceilings are typically older gypsum board over newer metal framed suspended ceiling tiles. Interior walls are wood framed covered with gypsum drywall over older wood. Exterior walls are wood siding covered with newer metal siding. Windows are newer metal replacements. The building was reportedly built in 1941.

## Description of study

### Investigation

All accessible areas of Building A-3726 were visually inspected for suspected asbestos containing materials (ACM) by a North Carolina accredited inspector. A copy of the inspector’s accreditation certificate is included in Appendix C. Bulk samples of suspect ACM’s were collected. This report details ACM as identified at the time of inspection only.

The bulk samples were analyzed by Carolina Environmental, Inc. The laboratory is accredited by the National Voluntary Laboratory Accredited Program (NVLAP Accreditation sponsored by the National Institute of Standards and Technology (NIST)). A copy of their accreditation certificates is included in Appendix C. The samples were

analyzed by the accepted method of polarized light microscopy (PLM) using EPA's Method EPA/M4-82-020. The laboratory's analytical report is included in Appendix A.

In compliance with the AHERA regulations, material is considered an Asbestos Containing Material (ACM) when it contains greater than one percent asbestos. Likewise, in this report, any material containing concentrations greater than one percent asbestos will be considered "positive". In some instances, materials containing one percent asbestos, or less, may be assumed to be an asbestos containing material at the discretion of the inspector. A narrative discussion of the AHERA ACM types (i.e., thermal systems insulation, miscellaneous and surfacing materials) found in Building A-3726 is included in this report where relevant. Bulk sample information appears on Table 1. Estimated quantities of individual asbestos containing materials appear on Table 2. Material characterization of asbestos containing materials appears on Table 3. The approximate location where each bulk sample was obtained is shown on the building floor plans, which appear as Figures. Positive ACM samples are highlighted on the floor plan Figures with their numbers enclosed in squares; samples with negative analytical results for asbestos are indicated with their numbers enclosed in circles. Most homogeneous areas are highlighted on the Figures. It is reasonable to assume that all materials similar to those testing positive, also contain positive amounts of asbestos and should be treated as such.

## Conclusions

### Thermal Systems Insulation (TSI)

TSI is insulation material applied to pipes, fittings, tanks, ducts, or for other interior structural components to prevent heat loss or gain, or water condensation, or for other purposes.

No asbestos containing TSI was located in Building A-3726.

### Miscellaneous Materials

Miscellaneous materials include building material on structural components, structural members or fixtures, such as floor and ceiling tiles, and do not include surfacing or TSI. In the past, there were a great number of miscellaneous building materials that had asbestos fibers added to them during the manufacturing process to increase durability and fireproofing qualities. The following suspect miscellaneous materials at Building No. A-3726 were found to contain or are assumed to contain asbestos:

- a. *Floor Tiles & Mastic:* The oldest lowest layer of floor tiles and associated felt and mastic throughout the building contains asbestos. These tiles are below several newer flooring layers consisting of carpet over white floor tiles over plywood over thick green canvass backed sheet vinyl over fiberboard. The

asbestos containing layer appears to be on the original tongue & groove wood subflooring. - (Refer to Tables 1, 2 and 3 for specific information and Figure 1 for sample locations).

- b. Roofing Materials:* Flashing cement applied to the round metal vent on the roof contains asbestos. - (Refer to Tables 1, 2 and 3 for specific information and Figure 2 for sample locations).
- c. Cement Board:* Cement wall and ceiling board in the mechanical room is assumed to contain asbestos. Some debris of this material was noted on the floor of the mechanical room. - (Refer to Tables 2 and 3 for specific information).

### **Surfacing**

Surfacing material is friable material that is sprayed on, troweled on, or otherwise applied to surfaces for decorative or other purposes.

No asbestos containing surfacing materials were located in Building A-3726.



**TABLE 1**  
**SUSPECT ACM SAMPLES**  
**Ft. BRAGG, BUILDING A-3726**

<b>FIELD ID</b>	<b>DESCRIPTION</b>	<b>LOCATION</b>	<b>ASBESTOS TYPE &amp; %</b>
3726-M-1	Duct flex joint	Mechanical Room 109, on supply duct at furnace	No Asbestos Detected
3726-M-2	Duct flex joint	Mechanical Room 109, on return duct at furnace	No Asbestos Detected
3726-1-3	2' X 2' typical ceiling tile	Room 101	No Asbestos Detected
3726-1-4	Cement floor	Room 101, patch under carpet	No Asbestos Detected
3726-1-5	White floor tile & mastic	Room 104, upper layer under carpet	No Asbestos Detected
3726-1-6	Green sheet vinyl flooring	Room 104, beneath sample 5 and a layer of plywood	No Asbestos Detected
<b>3726-1-7</b>	<b>Tile or felt paper? &amp; mastic</b>	<b>Room 104, beneath sample 6 and a layer of fiberboard</b>	<b>10% chrysotile</b>
3726-1-8	White floor tile & mastic	Room 103, upper layer under carpet	No Asbestos Detected
3726-1-9	Green sheet vinyl flooring	Room 103, under sample 8 and a layer of plywood	No Asbestos Detected
<b>3726-1-10</b>	<b>Floor tile &amp; mastic</b>	<b>Room 103, under sample 9 and a layer of fiberboard</b>	<b>Tile 5% chrysotile, mastic NAD</b>
3726-1-11	Felt paper & mastic	Room 103, under sample 10	No Asbestos Detected
3726-1-12	12" X 12" white floor tile & mastic	Room 110, upper layer	No Asbestos Detected
3726-1-13	Green sheet vinyl flooring	Room 110, below sample 12	No Asbestos Detected
3726-1-14	Felt paper & mastic	Room 110, under sample 13	No Asbestos Detected
3726-1-15	White with blue diamond pattern floor tile & mastic	Room 107, over older tiles	No Asbestos Detected
3726-1-16	Drywall joint compound	Room 101 wall	No Asbestos Detected
3726-1-17	Caulking material	Room 101 around window	No Asbestos Detected
3726-1-18	Drywall joint compound	Room 102 on older drywall ceiling above newer suspended ceiling	No Asbestos Detected
3726-1-19	Drywall joint compound	Room 104 on older drywall ceiling above newer suspended ceiling	No Asbestos Detected
3726-1-20	Drywall joint compound	Room 104 partition wall	No Asbestos Detected
3726-1-21	Drywall joint compound	Room 105 perimeter wall	No Asbestos Detected
3726-1-22	12" X 12" perforated ceiling tile	Room 105, older ceiling above newer suspended ceiling	No Asbestos Detected

3726-1-23	12" X 12" perforated ceiling tile	Room 105, older ceiling above newer suspended ceiling	No Asbestos Detected
3726-1-24	2' X 2' typical ceiling tile	Room 106	No Asbestos Detected
3726-1-25	2' X 2' patch ceiling tile	Room 106	No Asbestos Detected
3726-1-26	2' X 2' patch ceiling tile	Room 106	No Asbestos Detected
3726-1-27	Attic insulation	Attic above Room 106	No Asbestos Detected
3726-1-28	Caulking material	Room 108, shower door	No Asbestos Detected
<b>3726-R-29</b>	<b>Flashing cement</b>	<b>Roof, at metal vent</b>	<b>3% chrysotile</b>
3726-R-30	Roof shingle	Roof	No Asbestos Detected
3726-R-31	Roofing felt	Roof, under shingles	No Asbestos Detected
3726-R-32	Roof shingle	Roof	No Asbestos Detected
3726-R-33	Roofing felt	Roof, under shingles	No Asbestos Detected

Samples testing positive for asbestos indicated in **BOLD** type

NAD = No Asbestos Detected

**TABLE 2**  
**ACM QUANTITY SUMMARY**  
**Ft. BRAGG, BUILDING A-3726**

Homogeneous Area Descriptions	Units	Functional Space Descriptions								Totals
		INTERIOR	ROOF	MECHANICAL ROOM 109						
Floor tiles & mastic	S.F.	2200								2200
Flashing Cement	S.F.		1							1
Asbestos Cement Board	S.F.			600						600

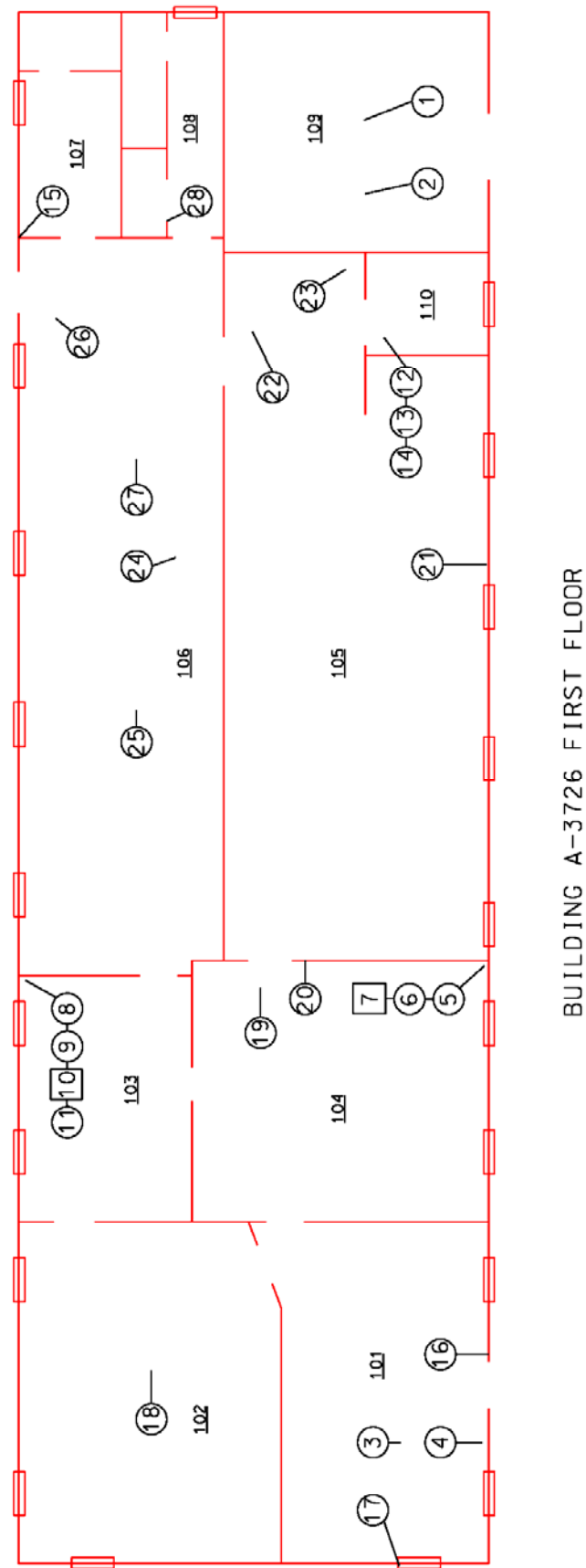
**S.F. = Square Foot, L.F. = Linear Foot, C.F. = Cubic Foot**

**TABLE 3**  
**MATERIAL CHARACTERIZATION AND ASSESSMENT**  
**Ft. BRAGG, BUILDING A-3726**

<b>MATERIAL</b>		<b>CHARACTERISTICS</b>			<b>ASSESSMENT</b>	
<b>Type</b>	<b>Description</b>	<b>Asbestos Yes/no/assumed</b>	<b>Quantity (If ACM)</b>	<b>Friable / Non- friable</b>	<b>Condition</b>	<b>Disturbance Potential</b>
Miscellaneous	Floor tiles & mastic	Yes	2200	Non-friable	Damaged	Low
Miscellaneous	Flashing Cement	Yes	1	Non-friable	Good	Low
Miscellaneous	Asbestos Cement Board	Assumed	600	Non-friable	Damaged	Moderate

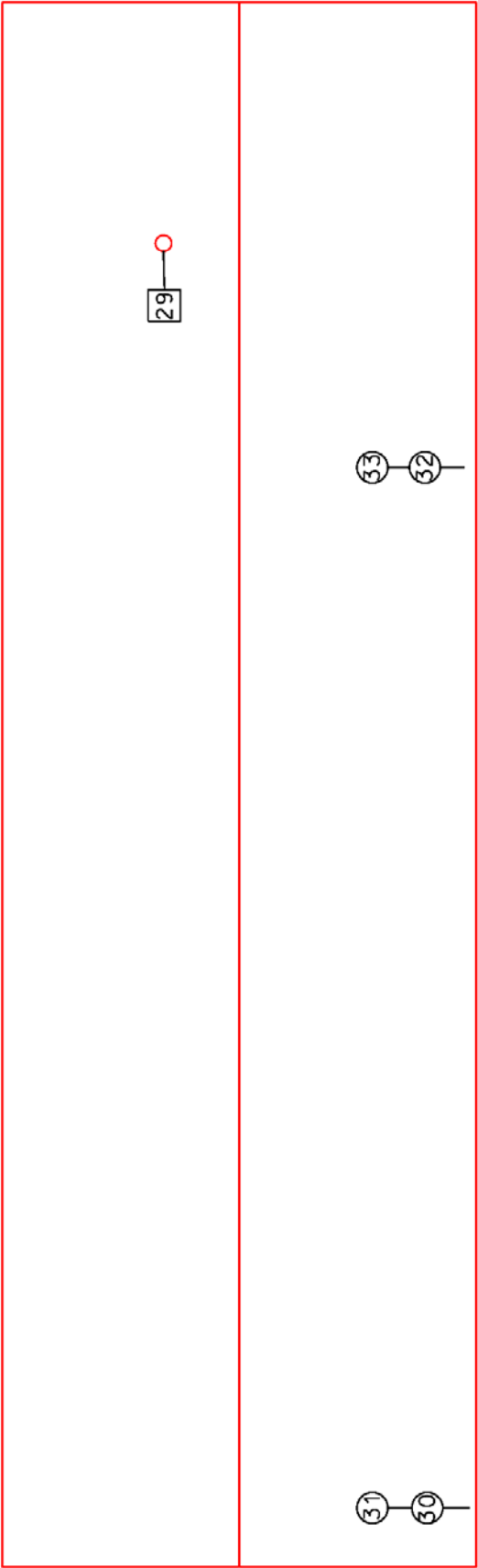
**S.F. = Square Foot, L.F. = Linear Foot, C.F. = Cubic Foot**

Figure 1



BUILDING A-3726 FIRST FLOOR

Figure 2



BUILDING A-3726 ROOF

# **Appendix A**

## **Analytical Report – Carolina Environmental, Inc.**

CAROLINA ENVIRONMENTAL, INC.  
107 New Edition Court, Cary, NC 27511  
Phone: (919) 481-1413 Fax: (919) 481-1442

## LABORATORY REPORT ASBESTOS BULK ANALYSIS

Client: **US Army Corps of Engineers - Savannah**  
**District - EMU9**  
200 North Cobb Parkway, Bldg. 400 Ste. 404  
Marietta, GA 30062

CEI Lab Code: A10-0684  
Received: 02-01-10  
Analyzed: 02-03-10  
Reported: 02-03-10  
Analyst: Ashley Miller

Project: Ft Bragg Building A-3726; 10178

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3726-M-1	A990972	<u>DUCT FLEX JOINT</u> Heterogeneous, Brown, Fibrous, Loosely Bound BIND 20 % SYNT 80 %	ND
3726-M-2	A990973	<u>DUCT FLEX JOINT</u> Heterogeneous, Brown, Fibrous, Loosely Bound BIND 20 % SYNT 80 %	ND
3726-1-3	A990974	<u>CEILING TILE</u> Heterogeneous, White, Tan, Fibrous, Loosely Bound PERL 20 % CELL 60 % PAINT 5 % FBGL 15 %	ND
3726-1-4	A990975	<u>CEMENT FLOOR</u> Homogeneous, Grey, Non-fibrous, Tightly Bound BIND 100 % CELL <1 %	ND
3726-1-5	A990976A	<u>CARPET MASTIC</u> Homogeneous, Yellow, Non-fibrous, Bound MAST 100 % CELL <1 %	ND
	A990976B	<u>FLOOR TILE</u> Homogeneous, Grey, Non-fibrous, Bound VINYL 100 % CELL <1 %	ND



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Phone: 919-481-1413 Fax: 919-481-1442

Project: Ft Bragg Building A-3726; 10178

Lab Code: A10-0684

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS			
	A990976C	<u>MASTIC</u> Homogeneous, Black, Non-fibrous, Bound	ND			
		MAST 100 % CELL <1 %				
3726-1-6	A990977	<u>SHEET VINYL FLOORING</u> Heterogeneous, Green, Fibrous, Bound	ND			
		VINYL 80 % CELL 20 %				
3726-1-7	A990978	<u>FELT PAPER/MASTIC</u> Heterogeneous, Black, Fibrous, Bound	CHRY 10%			
		CHRY 10% MAST 80 % CELL 10 %				
3726-1-8	A990979A	<u>CARPET MASTIC</u> Homogeneous, Yellow, Non-fibrous, Bound	ND			
		MAST 100 % CELL <1 %				
	A990979B	<u>FLOOR TILE</u> Homogeneous, Grey, Non-fibrous, Bound	ND			
		VINYL 100 % CELL <1 %				
	A990979C	<u>MASTIC</u> Homogeneous, Black, Non-fibrous, Bound	ND			
		MAST 100 % CELL <1 %				
3726-1-9	A990980	<u>SHEET VINYL FLOORING</u> Heterogeneous, Green, Fibrous, Bound	ND			
		VINYL 80 % CELL 20 %				

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Lab Code: A10-0684

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS	
3726-1-10	A990981A	<u>FLOOR TILE</u> Homogeneous, Brown, Fibrous, Bound	CHRY	5%
		CHRY 5% VINYL 95 % CELL <1 %		
	A990981B	<u>MASTIC</u> Homogeneous, Brown, Non-fibrous, Bound	ND	
		MAST 100 % CELL <1 %		
3726-1-11	A990982	<u>FLOORING/FELT/MASTIC</u> Heterogeneous, Brown, Grey, Fibrous, Bound	ND	
		VINYL 10 % CELL 55 % MAST 35 %		
3726-1-12	A990983A	<u>FLOOR TILE</u> Homogeneous, Grey, Fibrous, Bound	ND	
		VINYL 100 % CELL <1 %		
	A990983B	<u>MASTIC</u> Homogeneous, Black, Fibrous, Bound	ND	
		MAST 95 % CELL 5 %		
3726-1-13	A990984	<u>SHEET VINYL FLOORING</u> Heterogeneous, Green, Fibrous, Bound	ND	
		VINYL 80 % CELL 20 %		
3726-1-14	A990985	<u>SHEET VINYL FLOORING/FELT/MASTIC</u> Heterogeneous, Grey, Fibrous, Bound	ND	
		VINYL 70 % CELL 20 % MAST 10 %		

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Lab Code: A10-0684

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3726-1-15	A990986A	<u>FLOOR TILE</u> Homogeneous, White, Non-fibrous, Bound VINYL 100 % CELL <1 %	ND
	A990986B	<u>MASTIC</u> Homogeneous, Clear, Non-fibrous, Bound MAST 100 % CELL <1 %	ND
3726-1-16	A990987	<u>DRYWALL JOINT COMPOUND</u> Heterogeneous, White, Non-fibrous, Bound PLAS 100 % CELL <1 % PAINT <1 %	ND
3726-1-17	A990988	<u>CAULKING</u> Heterogeneous, White, Non-fibrous, Bound CAULK 95 % CELL <1 % PAINT 5 %	ND
3726-1-18	A990989	<u>DRYWALL JOINT COMPOUND</u> Heterogeneous, White, Non-fibrous, Bound PLAS 95 % CELL <1 % PAINT 5 %	ND
3726-1-19	A990990	<u>DRYWALL JOINT COMPOUND</u> Heterogeneous, White, Non-fibrous, Bound PLAS 95 % CELL <1 % PAINT 5 %	ND
3726-1-20	A990991	<u>DRYWALL JOINT COMPOUND</u> Heterogeneous, White, Non-fibrous, Bound PLAS 95 % CELL <1 % PAINT 5 %	ND

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Lab Code: A10-0684

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3726-1-22	A990992	<u>CEILING TILE</u> Heterogeneous, White, Tan, Fibrous, Loosely Bound PAINT 5 % CELL 95 %	ND
3726-1-23	A990993	<u>CEILING TILE</u> Heterogeneous, White, Tan, Fibrous, Loosely Bound PAINT 5 % CELL 95 %	ND
3726-1-24	A990994	<u>CEILING TILE</u> Heterogeneous, White, Tan, Fibrous, Loosely Bound PERL 20 % CELL 60 % PAINT 5 % FBGL 15 %	ND
3726-1-25	A990995	<u>CEILING TILE</u> Heterogeneous, White, Tan, Fibrous, Loosely Bound PERL 20 % CELL 60 % PAINT 5 % FBGL 15 %	ND
3726-1-26	A990996	<u>CEILING TILE</u> Heterogeneous, White, Tan, Fibrous, Loosely Bound PERL 20 % CELL 60 % PAINT 5 % FBGL 15 %	ND
3726-1-27	A990997	<u>ATTIC INSULATION</u> Heterogeneous, Grey, Fibrous, Loosely Bound FBGL 100 %	ND
3726-1-28	A990998	<u>CAULKING</u> Heterogeneous, Grey, Non-fibrous, Bound CAULK 95 % CELL <1 % PAINT 5 %	ND

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Project: Ft Bragg Building A-3726; 10178

Lab Code: A10-0684

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS	
3726-R-29	A990999	<u>FLASHING CEMENT</u> Silver, Black, Fibrous, Bound	CHRY	3%
	Heterogeneous,	CHRY 3% TAR 95 % CELL <1 % PAINT 2 %		
3726-R-30	A991000	<u>ROOF SHINGLE</u> Black, Fibrous, Bound	ND	
	Heterogeneous,	TAR 65 % FBGL 10 % GRAV 25 %		
3726-R-31	A991001	<u>ROOFING FELT</u> Black, Fibrous, Bound	ND	
	Homogeneous,	TAR 40 % CELL 60 %		
3726-R-32	A991002	<u>ROOF SHINGLE</u> Black, Fibrous, Bound	ND	
	Heterogeneous,	TAR 65 % FBGL 10 % GRAV 25 %		
3726-R-33	A991003	<u>ROOFING FELT</u> Black, Fibrous, Bound	ND	
	Homogeneous,	TAR 40 % CELL 60 %		

**The following definitions apply to the abbreviations used in the ASBESTOS BULK ANALYSIS REPORT:**

CHRY = Chrysotile	CELL = Cellulose	DEBR = Debris
AMOS = Amosite	FBGL = Fibrous Glass	BIND = Binder
CROC = Crocidolite	CACO = Calcium Carbonate	SILI = Silicates
TREM = Tremolite	SYNT = Synthetics	GRAV = Gravel
ANTH = Anthophyllite	WOLL = Wollastonite	MAST = Mastic
ACTN = Actinolite	CERWL = Ceramic Wool	PLAS = Plaster
N D = None Detected	NTREM = Non-Asbestiform Tremolite	PERL = Perlite
NANTH = Non-Asbestiform Anthophyllite	FBGY = Fibrous Gypsum	RUBR = Rubber
		VER = Vermiculite

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**CLIENT:** US Army Corps of Engineers - Savannah District - EMU9

**PROJECT:** Ft Bragg Building A-3726; 10178

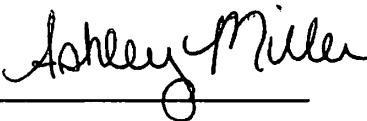
**CEI LAB CODE:** A10-0684

Stereoscopic microscopy and polarized light microscopy coupled with dispersion staining is the analytical technique used for sample identification. The percentage of each component is visually estimated by volume. These results pertain only to the samples analyzed. The samples were analyzed as submitted by the client and may not be representative of the larger material in question. Unless notified in writing to return samples, Carolina Environmental, Inc. will discard all bulk samples after 30 days.

Many vinyl floor tiles have been manufactured using greater than 1% asbestos. Often the asbestos was milled to a fiber size below the detection limit of polarized light microscopy. Therefore, a "None Detected" (ND) reading on vinyl floor tile does not necessarily exclude the presence of asbestos. Transmission electron microscopy provides a more conclusive form of analysis for vinyl floor tiles.

It is certified by the signature below that Carolina Environmental, Inc. is accredited by the National Voluntary Accreditation Program (NVLAP) for the analysis of asbestos in bulk materials. The accredited test method is EPA / 600 / M4-82 / 020 for the analysis of asbestos in building materials. Procedures described in EPA / 600 / R-93 / 116 have been incorporated where applicable. The detection limit for the method is 0.1% (trace amount). Carolina Environmental, Inc.'s NVLAP accreditation number is #101768-0. This report is not to be used to claim product endorsement by NVLAP or any agency of the U. S. Government. This report and its contents are only valid when reproduced in full. Dust and soil analyses for asbestos using PLM are not covered under NVLAP accreditation.

**ANALYST**



**REVIEWED BY**



Tianbao Bai, Ph.D.  
Laboratory Director

**End of Report**

# **Appendix B**

## **Sample Chain of Custody Forms**

A10.0684 (32)  
A990972. A 991003

**ASBESTOS CHAIN OF CUSTODY - US ARMY CORPS OF ENGINEERS**

Project: <b>Ft Bragg Building A-3726</b>	Job No.: <b>10178</b>
Sampler: <b>Tim Jones</b>	Analysis: <b>PLM</b>

DATE	FIELD ID	EMU ID	COMPONENTS/NOTES
1/21/2010	3726-M-1	62404	Duct flex joint
1/21/2010	3726-M-2	62405	Duct flex joint
1/21/2010	3726-1-3	62406	Ceiling tile
1/21/2010	3726-1-4	62407	Cement floor
1/21/2010	3726-1-5	62408	Floor tile & mastic
1/21/2010	3726-1-6	62409	Sheet vinyl flooring
1/21/2010	3726-1-7	62410	Felt paper & mastic
1/21/2010	3726-1-8	62411	Floor tile & mastic
1/21/2010	3726-1-9	62412	Sheet vinyl flooring
1/21/2010	3726-1-10	62413	Floor tile & mastic
1/21/2010	3726-1-11	62414	Felt paper & mastic
1/21/2010	3726-1-12	62415	Floor tile & mastic
1/21/2010	3726-1-13	62416	Sheet vinyl flooring
1/21/2010	3726-1-14	62417	Felt paper & mastic
1/21/2010	3726-1-15	62418	Floor tile & mastic
1/21/2010	3726-1-16	62419	Drywall joint compound
1/21/2010	3726-1-17	62420	Caulking material
1/21/2010	3726-1-18	62421	Drywall joint compound
1/21/2010	3726-1-19	62422	Drywall joint compound
1/21/2010	3726-1-20	62423	Drywall joint compound
* 1/21/2010	3726-1-21	62424	Drywall joint compound
1/21/2010	3726-1-22	62425	Ceiling tile

Relinquished By	Date	Time	Received By	Date	Time
<i>Tim Jones</i>	<i>1-21-10</i>	<i>1400</i>	<i>Kita Nell</i>	<i>02/01/10</i>	<i>3:20PM</i>

--

\* Sample not submitted (AU)





# **Appendix C**

## **Certifications & Accreditations**



North Carolina Department of Health and Human Services  
Division of Public Health · Epidemiology Section  
Occupational and Environmental Epidemiology Branch  
1912 Mail Service Center · Raleigh, North Carolina 27699-1912  
Tel 919-707-5950 · Fax 919-870-4808

Beverly Eaves Perdue, Governor  
Lanier M. Cansler, Secretary

Jeffrey P. Engel, M.D.  
State Health Director

October 26, 2009

Timothy A Jones  
4411 Smoke Stone Court  
Marietta, GA 30062

Dear Mr. Jones:

Based upon the review of your accreditation application, the Health Hazards Control Unit (HHCU) has determined that you have fulfilled the requirements and are eligible for asbestos accreditation as a(n) INSPECTOR. Your assigned North Carolina accreditation number is 12210, which is reflected on your enclosed North Carolina Accreditation card. Please be sure to take this card with you to any asbestos work site where you are employed. The State requires that all persons conducting asbestos abatement or asbestos management activities be accredited and have their identification card on site.

Your North Carolina Inspector accreditation will expire on SEPTEMBER 30, 2010. It is NOT the policy of the HHCU to issue renewal notices. If you wish to continue working as a(n) Inspector after this expiration date, you must successfully complete the required training and submit a completed application to this office prior to September 30, 2010. If you should continue to perform asbestos management activities as a(n) Inspector without a valid North Carolina accreditation, you will be in violation of State regulations and may be cited for noncompliance.

Sincerely,

A handwritten signature in black ink, appearing to read "Marita E Cheek".

Marita E Cheek  
Accreditation/Certification Secretary  
Health Hazards Control Unit

Enclosure

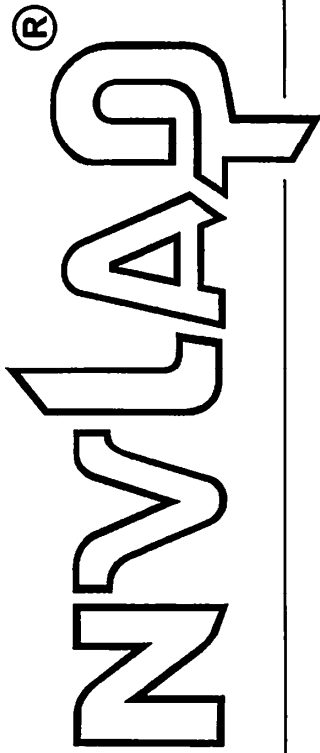


North Carolina Public Health  
Working for a healthier and safer North Carolina  
Everywhere. Everyday. Everybody.

Location: 5505 Six Forks Road, 2nd Floor, Room D-1 · Raleigh, N.C. 27609



United States Department of Commerce  
National Institute of Standards and Technology



## Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 101768-0

**Carolina Environmental, Inc.**  
Cary, NC

is accredited by the National Voluntary Laboratory Accreditation Program for specific services,  
listed on the Scope of Accreditation, for:

### BULK ASBESTOS FIBER ANALYSIS

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.  
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).

2009-04-01 through 2010-03-31

Effective dates



*Dolly J. Bruce*  
For the National Institute of Standards and Technology

NVLAP-01C (REV. 2009-01-28)



**US Army Corps  
of Engineers®**

# Savannah District Environmental and Materials Unit

## *Hazardous Building Materials Survey*

# Building No. A-3726 Fort Bragg, North Carolina

Prepared by Timothy A. Jones



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The findings of this report are not to be construed as an official Department of the Army position, unless so designated by other authorized documents.

**Hazardous Building Materials Survey**

**January 2010**

# **Building No. A-3726 Fort Bragg, North Carolina**

by Timothy A. Jones

Final Report

**Prepared for**

**U.S. Army Corps of Engineers  
Savannah District**

# Hazardous Building Materials Survey Report

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## Introduction

### Background

Building A-3726 is a 2300 square foot single story wood frame structure with a wood frame floor system topped with a combination of vinyl floor tiles and carpet. The roof system is asphalt shingles over wood decking. Interior ceilings are typically older gypsum board over newer metal framed suspended ceiling tiles. Interior walls are wood framed covered with gypsum drywall over older wood. Exterior walls are wood siding covered with newer metal siding. Windows are newer metal replacements. The building was reportedly built in 1941.

## Description of study

### Investigation

This report documents the hazardous building materials survey of Building No. A-3726 at Fort Bragg, North Carolina conducted on 21 January 2010 by USACE Savannah District employees Tim Jones and Jason Hart and includes only building materials located at the time of inspection. This survey was conducted in general accordance with the Statement of Services for Hazardous Building Material Inspections developed by Ray Willingham, retired, USACE Savannah District. The investigation includes a visual identification and location of such items as: fluorescent and mercury-vapor lights; battery back-up exit lights and emergency lights; mercury-containing thermostats and switches; refrigerant containing air conditioners, water fountains and ice makers; above and below ground storage tanks; transformers; built in chemical type fire suppression systems; smoke detectors; and lead building materials excluding lead based paint. Other hazardous building materials not listed above may also be included at the discretion of the inspectors. Asbestos is excluded from this inspection as it is covered separately in an asbestos inspection report.



## Conclusions

The following information gathered during the survey of Building A-3726 is presented in attached information:

- a. *Light Count:* The fluorescent and mercury vapor light count results are presented in Table 1.
- b. *Lead Building Materials:* Inspection of the building revealed lead in the cast iron plumbing drainage and vent piping system used as pipe joints. Lead flashings are used at the pipe penetrations through the roof. Details are outlined in Table 2.
- c. *Fire Extinguishers:* Five portable fire extinguishers were found within the building.
- d. *Compressed Refrigerant Gas:* One refrigerated drinking fountain was located within the building. Seven window air conditioners and one small central air conditioner were located in the building. One refrigerator and three portable de-humidifiers were located in the building. These units are assumed to contain refrigerant gas that should be recovered prior to demolition.
- e. *Smoke Detectors:* Two smoke detectors were located in the building.

# Tables

**TABLE 1**  
**FORT BRAGG BUILDING A-3726**  
**FLUORESCENT AND MERCURY LIGHT FIXTURES**

<b>AREA IDENTIFICATION</b>	<b># &amp; TYPE LIGHTS PRESENT</b>	<b>DESCRIPTION OF LIGHTS</b>
Interior	24	4 Bulb, 4 Foot Fluorescent Fixtures

**TABLE 2**  
**FORT BRAGG BUILDING A-3726**  
**LEAD BUILDING COMPONENTS**

<b>BUILDING COMPONENT</b>	<b>DESCRIPTION</b>	<b>LOCATION</b>	<b>ESTIMATED NUMBER</b>
Lead Flashing	Roof flashing	Roof	2
Hot poured lead pipe joint	In plumbing drainage, waste and vent piping	Under the building and in plumbing chase walls	25-35



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# **Savannah District Environmental and Materials Unit**

## **Building A-3728 Ft. Bragg, North Carolina**

**Prepared by Timothy A. Jones**



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The findings of this report are not to be construed as an official Department of the Army position, unless so designated by other authorized documents.

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**Asbestos Survey**

**January 2010**

# **Building A-3728 Fort Bragg, NC**

Prepared by Timothy A. Jones

Final report

**Prepared for US Army Corps of Engineers  
Savannah District**

# Asbestos Inspection Report

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## Introduction

### Scope of the Investigation

This report documents the asbestos inspection and survey of Building A-3728 at Fort Bragg, North Carolina conducted on 22 January 2010 by Savannah District US Army Corps of Engineers employee Tim Jones. The survey was conducted in general accordance with the regulatory guidelines in the Asbestos Hazard Emergency Response Act (AHERA) (40 CFR Part 763 Subpart E Sections 763.80-763.88) and “Guidance for Controlling Asbestos-Containing Materials in Buildings” (Purple Book) (EPA publication number 560/5-85-024). Although not required by the AHERA guidelines, roof and other exterior miscellaneous materials were also inspected and sampled.

### Background

Building A-3728 is a 1700 square foot single story wood frame structure with a wood frame floor system topped with red cement and vinyl floor tiles. The roof system is asphalt shingles over wood decking. Interior ceilings are older gypsum board with newer metal framed suspended tiles added in some rooms. Interior walls are wood framed covered with gypsum drywall. Exterior walls are wood siding covered with newer metal siding. Windows are newer metal replacements. The building was reportedly built in 1941.

## Description of study

### Investigation

All accessible areas of Building A-3728 were visually inspected for suspected asbestos containing materials (ACM) by a North Carolina accredited inspector. A copy of the inspector’s accreditation certificate is included in Appendix C. Bulk samples of suspect ACM’s were collected. This report details ACM as identified at the time of inspection only.

The bulk samples were analyzed by Carolina Environmental, Inc. The laboratory is accredited by the National Voluntary Laboratory Accredited Program (NVLAP Accreditation sponsored by the National Institute of Standards and Technology (NIST)). A copy of their accreditation certificates is included in Appendix C. The samples were

analyzed by the accepted method of polarized light microscopy (PLM) using EPA's Method EPA/M4-82-020. The laboratory's analytical report is included in Appendix A.

In compliance with the AHERA regulations, material is considered an Asbestos Containing Material (ACM) when it contains greater than one percent asbestos. Likewise, in this report, any material containing concentrations greater than one percent asbestos will be considered "positive". In some instances, materials containing one percent asbestos, or less, may be assumed to be an asbestos containing material at the discretion of the inspector. A narrative discussion of the AHERA ACM types (i.e., thermal systems insulation, miscellaneous and surfacing materials) found in Building A-3728 is included in this report where relevant. Bulk sample information appears on Table 1. Estimated quantities of individual asbestos containing materials appear on Table 2. Material characterization of asbestos containing materials appears on Table 3. The approximate location where each bulk sample was obtained is shown on the building floor plans, which appear as Figures. Positive ACM samples are highlighted on the floor plan Figures with their numbers enclosed in squares; samples with negative analytical results for asbestos are indicated with their numbers enclosed in circles. Most homogeneous areas are highlighted on the Figures. It is reasonable to assume that all materials similar to those testing positive, also contain positive amounts of asbestos and should be treated as such.

## Conclusions

### Thermal Systems Insulation (TSI)

TSI is insulation material applied to pipes, fittings, tanks, ducts, or for other interior structural components to prevent heat loss or gain, or water condensation, or for other purposes.

No asbestos containing TSI was located in Building A-3728.

### Miscellaneous Materials

Miscellaneous materials include building material on structural components, structural members or fixtures, such as floor and ceiling tiles, and do not include surfacing or TSI. In the past, there were a great number of miscellaneous building materials that had asbestos fibers added to them during the manufacturing process to increase durability and fireproofing qualities. The following suspect miscellaneous materials at Building No. A-3728 were found to contain or are assumed to contain asbestos:

- a. *Flooring Materials:* Older tan floor tiles and mastic under carpet in Rooms 101, 102, 103 and 106 contain asbestos. Older black 9" X 9" floor tiles under newer sheet vinyl in Room 105 contain asbestos. Red cement flooring under the floor



tiles throughout the majority of the building contains asbestos. - (Refer to Tables 1, 2 and 3 for specific information and Figure 1 for sample locations).

- b. Cement Board:* Cement wall and ceiling board in the mechanical room is assumed to contain asbestos. - (Refer to Tables 2 and 3 for specific information).
- c. Duct Flex Joint:* White cloth duct flex joint between both the supply and return ducts and the furnace in the mechanical room is assumed to contain asbestos. - (Refer to Tables 2 and 3 for specific information).
- d. Drywall Joint Compound:* Drywall joint compound applied to walls throughout the majority of the building contains asbestos. Drywall joint compound that may be applied to gypsum board ceilings is assumed to contain asbestos. - (Refer to Tables 1, 2 and 3 for specific information and Figure 1 for sample locations).
- e. Cement:* Tan cement material applied as a sealant where the furnace vent penetrates the mechanical room wall contains asbestos. - (Refer to Tables 1, 2 and 3 for specific information and Figure 1 for sample locations).

## Surfacing

Surfacing material is friable material that is sprayed on, troweled on, or otherwise applied to surfaces for decorative or other purposes.

Textured ceiling surfacing material was sampled and found to be non asbestos containing material.

**TABLE 1**  
**SUSPECT ACM SAMPLES**  
**Ft. BRAGG, BUILDING A-3728**

<b>FIELD ID</b>	<b>DESCRIPTION</b>	<b>LOCATION</b>	<b>ASBESTOS TYPE &amp; %</b>
3728-1-1	Textured ceiling surfacing	Room 103, on drywall ceiling	No Asbestos Detected
3728-1-2	Textured ceiling surfacing	Room 103, on drywall ceiling	No Asbestos Detected
3728-1-3	Textured ceiling surfacing	Room 103, on drywall ceiling	No Asbestos Detected
3728-1-4	Ceiling tile	Room 101	No Asbestos Detected
<b>3728-1-5</b>	<b>Gypsum board &amp; joint compound</b>	<b>Room 103 wall</b>	<b>Joint compound 2% chrysotile, drywall NAD</b>
3728-1-6	Caulking material	Room 103 on crown molding	No Asbestos Detected
3728-1-7	Caulking material	Room 103 on window trim	No Asbestos Detected
3728-1-8	Drywall joint compound	Room 103 wall	No Asbestos Detected
<b>3728-1-9</b>	<b>Drywall joint compound</b>	<b>Room 103 wall</b>	<b>Joint compound 2% chrysotile, drywall NAD</b>
3728-1-10	Caulking material	Room 103 on crown molding	No Asbestos Detected
<b>3728-1-11</b>	<b>Drywall joint compound</b>	<b>Room 101 wall</b>	<b>Joint compound 2% chrysotile, drywall NAD</b>
<b>3728-1-12</b>	<b>12" X 12" tan with black floor tile &amp; mastic</b>	<b>Room 103, upper layer under carpet</b>	<b>Tile 2% chrysotile, mastic 5% chrysotile</b>
<b>3728-1-13</b>	<b>Red cement flooring</b>	<b>Room 103 under sample 12</b>	<b>2% chrysotile</b>
3728-1-14	Felt paper	Room 103 under sample 13	No Asbestos Detected
<b>3728-1-15</b>	<b>Tan floor tile &amp; mastic</b>	<b>Room 103 under carpet</b>	<b>Tile 2% chrysotile, mastic 3% chrysotile</b>
<b>3728-1-16</b>	<b>Red cement flooring</b>	<b>Room 103 under sample 15</b>	<b>2% chrysotile</b>
3728-1-17	Felt paper	Room 103 under sample 16	No Asbestos Detected
3728-1-18	Black mastic?	Room 103 under sample 17	No Asbestos Detected
<b>3728-1-19</b>	<b>Tan floor tile &amp; mastic</b>	<b>Room 106 under carpet</b>	<b>Tile 5% chrysotile, mastic 3% chrysotile</b>
3728-1-20	Sheet vinyl flooring	Room 105 upper layer over older tiles	No Asbestos Detected
3728-1-21	Sheet vinyl flooring	Room 105 upper layer	No Asbestos Detected
<b>3728-1-22</b>	<b>9" X 9" black floor tile &amp; mastic</b>	<b>Room 105 under sample 21</b>	<b>Tile 5% chrysotile, mastic NAD</b>
3728-1-23	Attic insulation	Attic	No Asbestos Detected
3728-1-24	Ceiling tile	Room 102	No Asbestos Detected

<b>3728-1-25</b>	<b>Drywall joint compound</b>	<b>Room 102 wall</b>	<b>2% chrysotile</b>
3728-1-26	Caulking material	Room 103 wall where duct penetrates	No Asbestos Detected
<b>3728-M-27</b>	<b>Cement</b>	<b>Mechanical Room 104, where furnace flue pipe penetrates wall</b>	<b>3% chrysotile</b>
3728-R-28	Roof shingle	Roof	No Asbestos Detected
3728-R-29	Roofing felt	Roof, under shingles	No Asbestos Detected
3728-R-30	Roof shingle	Roof	No Asbestos Detected
3728-R-31	Roofing felt	Roof, under shingles	No Asbestos Detected
3728-E-32	Caulking material	Exterior around windows on metal siding	No Asbestos Detected
3728-E-33	Caulking material	Exterior around windows on metal siding	No Asbestos Detected

Samples testing positive for asbestos indicated in **BOLD** type

NAD = No Asbestos Detected

**TABLE 2**  
**ACM QUANTITY SUMMARY**  
**Ft. BRAGG, BUILDING A-3728**

Homogeneous Area Descriptions	Units	Functional Space Descriptions								
		Room 101	Room 102	Room 103	Room 104	Room 105	Room 106	Interior		Totals
Tan floor tiles & mastic	S.F.	130	140	1050			145			1465
Black 9" X 9" floor tiles	S.F.					160				160
Red cement flooring	S.F.	130	140	1050		160	145			1625
Drywall joint compound	S.F.							4125		4125
Asbestos Cement Board	S.F.			560						560
Cement	C.F.						1			1
Duct flex joint	L.F.						16			16

**S.F. = Square Foot, L.F. = Linear Foot, C.F. = Cubic Foot**

**TABLE 3**  
**MATERIAL CHARACTERIZATION AND ASSESSMENT**  
**Ft. BRAGG, BUILDING A-3728**

<b>MATERIAL</b>		<b>CHARACTERISTICS</b>			<b>ASSESSMENT</b>	
<b>Type</b>	<b>Description</b>	<b>Asbestos Yes/no/assumed</b>	<b>Quantity</b>	<b>Friable / Non- friable</b>	<b>Condition</b>	<b>Disturbance Potential</b>
Miscellaneous	Tan floor tiles & mastic	Yes	1465 S.F.	Non-friable	Good	Low
Miscellaneous	Black 9" X 9" floor tiles	Yes	160 S.F.	Non-friable	Good	Low
Miscellaneous	Red cement flooring	Assumed	1625 S.F.	Non-friable	Good	Low
Miscellaneous	Drywall joint compound	Yes	4125 S.F.	Friable	Good	Low
Miscellaneous	Asbestos Cement Board	Assumed	560 S.F.	Non-friable	Good	Low
Miscellaneous	Cement	Yes	1 C.F.	Non-friable	Good	Low
Miscellaneous	Duct flex joint	Assumed	16 L.F.	Non-friable	Good	Low

**S.F. = Square Foot, L.F. = Linear Foot, C.F. = Cubic Foot**

Figure 1

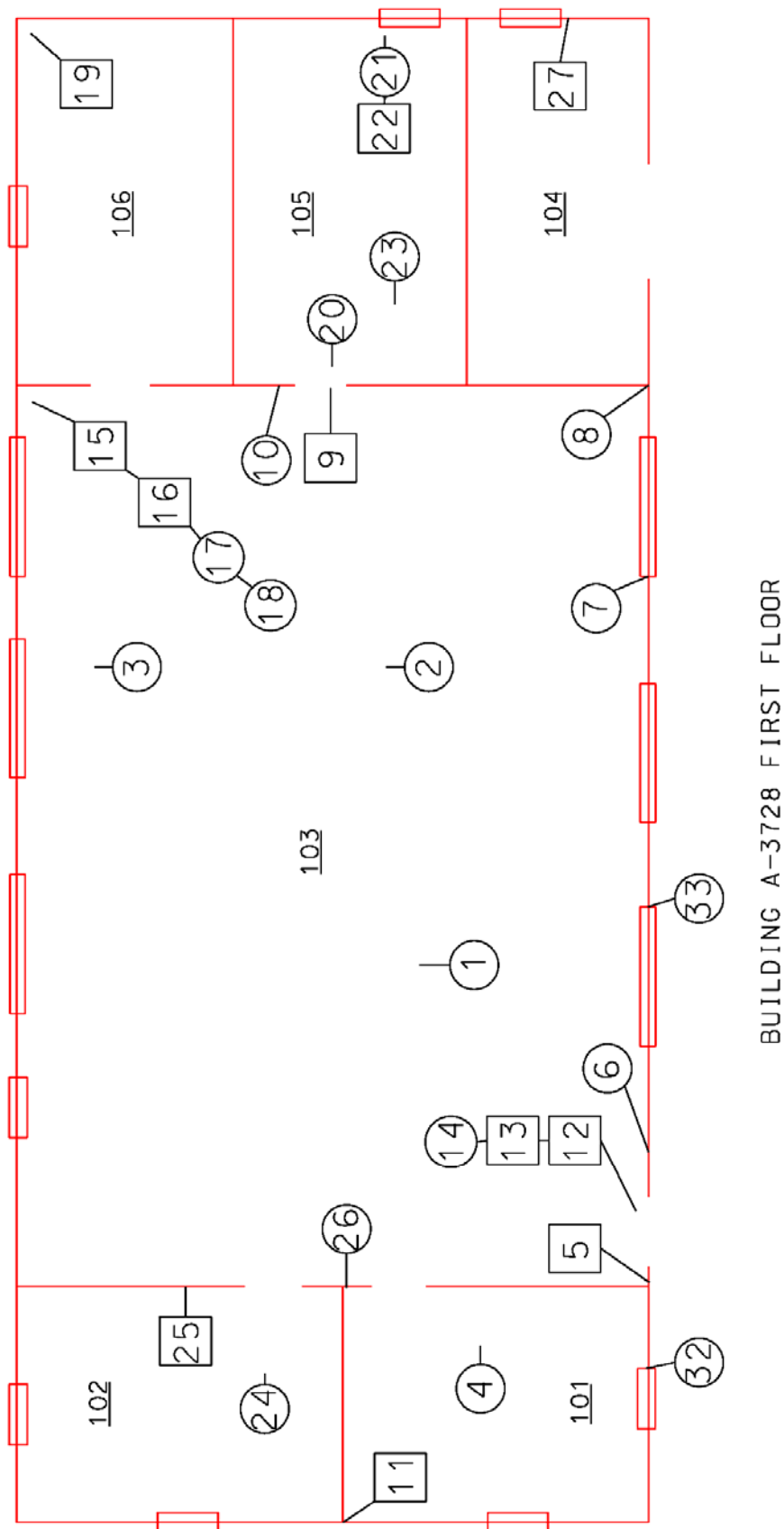
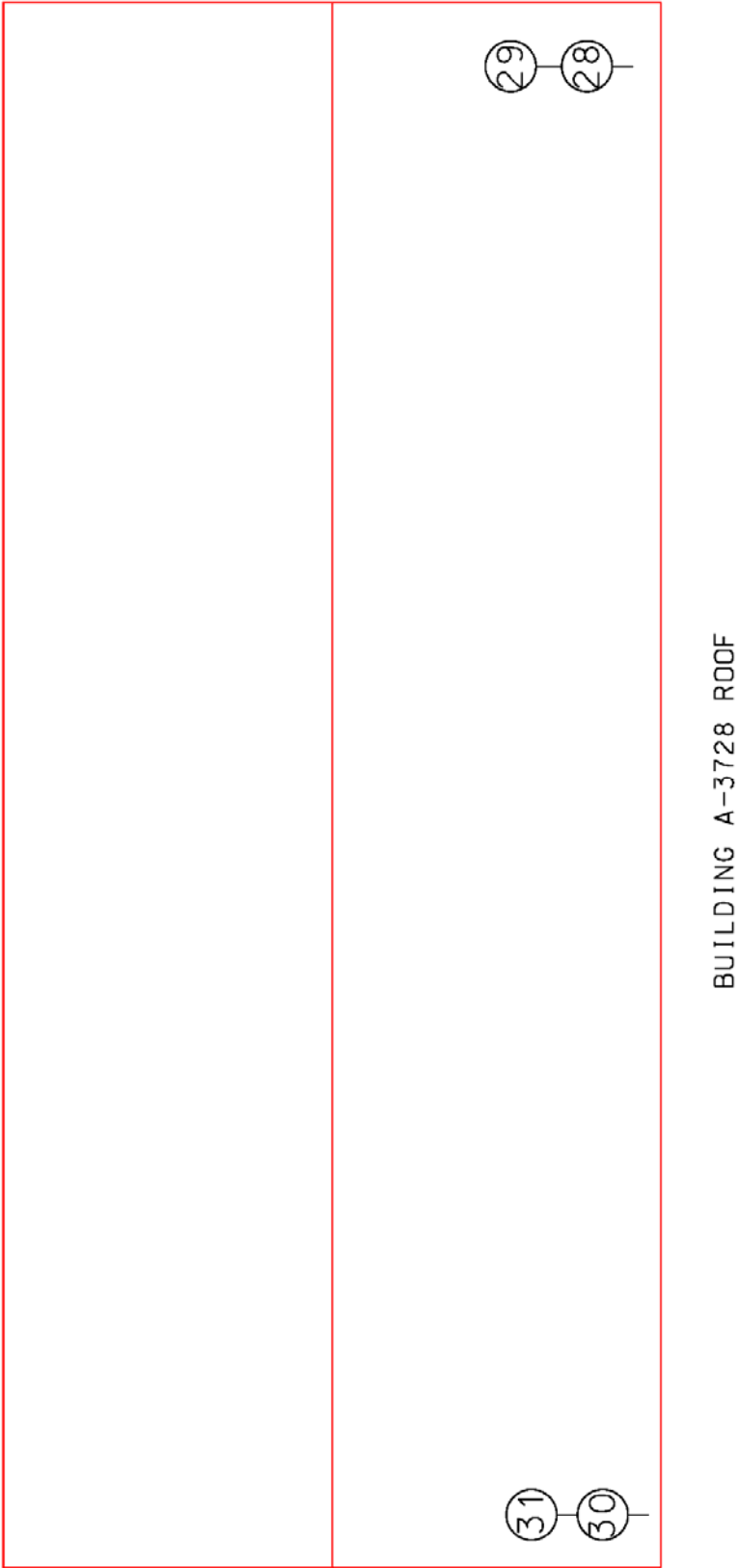


Figure 2



# **Appendix A**

## **Analytical Report – Carolina Environmental, Inc.**



CAROLINA ENVIRONMENTAL, INC.  
107 New Edition Court, Cary, NC 27511  
Phone: (919) 481-1413 Fax: (919) 481-1442

## LABORATORY REPORT ASBESTOS BULK ANALYSIS

Client: **US Army Corps of Engineers - Savannah**  
**District - EMU9**  
200 North Cobb Parkway, Bldg. 400 Ste. 404  
Marietta, GA 30062

CEI Lab Code: A10-0683  
Received: 02-01-10  
Analyzed: 02-03-10  
Reported: 02-03-10  
Analyst: Ashley Miller

Project: Ft Bragg Building A-3728; 10178

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION				% ASBESTOS
3728-1-1	A990939	<u>TEXTURED CEILING SURFACING</u>				ND
	Heterogeneous,	White, Non-fibrous, Bound				
		PLAS	95 %	CELL	<1 %	
		PAINT	5 %			
3728-1-1	A990939	<u>TEXTURED CEILING SURFACING</u>				ND
	Heterogeneous,	White, Non-fibrous, Bound				
		PLAS	95 %	CELL	<1 %	
		PAINT	5 %			
3728-1-2	A990940	<u>TEXTURED CEILING SURFACING</u>				ND
	Heterogeneous,	White, Non-fibrous, Bound				
		PLAS	95 %	CELL	<1 %	
		PAINT	5 %			
3728-1-3	A990941	<u>TEXTURED CEILING SURFACING</u>				ND
	Heterogeneous,	White, Non-fibrous, Bound				
		PLAS	95 %	CELL	<1 %	
		PAINT	5 %			
3728-1-4	A990942	<u>CEILING TILE</u>				ND
	Heterogeneous,	White, Tan, Fibrous, Loosely Bound				
		PERL	20 %	CELL	60 %	
		PAINT	5 %	FBGL	15 %	
3728-1-5	A990943	<u>GYPSUM BOARD/JOINT COMPOUND</u>				CHRY <1%
	Heterogeneous,	White, Fibrous, Bound				
		CHRY	<1%	GYPSUM	90 %	CELL 5 %
				PLAS	5 %	FBGL <1 %
				PAINT	<1 %	

JC contains 2% CHRY. Sample is <1% overall.

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Project: Ft Bragg Building A-3728; 10178

Lab Code: A10-0683

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION						% ASBESTOS
3728-1-6	A990944	<u>CAULKING</u> Heterogeneous,	White, Non-fibrous, Bound	CAULK	95 %	CELL	<1 %	ND
				PAINT	5 %			
3728-1-7	A990945	<u>CAULKING</u> Heterogeneous,	White, Non-fibrous, Bound	CAULK	95 %	CELL	<1 %	ND
				PAINT	5 %			
3728-1-8	A990946	<u>DRYWALL JOINT COMPOUND</u> Heterogeneous,	White, Non-fibrous, Bound	PLAS	95 %	CELL	<1 %	ND
				PAINT	5 %			
3728-1-9	A990947	<u>DRYWALL/JOINT COMPOUND</u> Heterogeneous,	Off-white, Fibrous, Bound	CHRY	<1%	GYPSUM	85 %	CHRY <1%
JC contains 2% CHRY. Sample is <1% overall.				PLAS	5 %	CELL	5 %	
				PAINT	5 %	FBGL	<1 %	
3728-1-10	A990948	<u>CAULKING</u> Heterogeneous,	White, Non-fibrous, Bound	CAULK	95 %	CELL	<1 %	ND
				PAINT	5 %			
3728-1-11	A990949	<u>DRYWALL/JOINT COMPOUND</u> Heterogeneous,	Off-white, Fibrous, Bound	CHRY	<1%	GYPSUM	85 %	CHRY <1%
JC contains 2% CHRY. Sample is <1% overall.				PLAS	5 %	CELL	5 %	
				PAINT	5 %	FBGL	<1 %	
3728-1-12	A990950A	<u>FLOOR TILE</u> Homogeneous,	Tan, Fibrous, Bound	CHRY	2%	VINYL	98 %	CHRY 2%
						CELL	<1 %	

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Lab Code: A10-0683

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS	
	A990950B	<u>MASTIC</u> Homogeneous, Black, Fibrous, Bound	CHRY	5%
		CHRY 5% MAST 95 % CELL <1 %		
3728-1-13	A990951	<u>CEMENT FLOORING</u> Homogeneous, Red, Fibrous, Tightly Bound	CHRY	2%
		CHRY 2% BIND 98 % CELL <1 %		
3728-1-14	A990952	<u>FELT PAPER</u> Homogeneous, Black, Fibrous, Bound	ND	
		TAR 40 % CELL 60 %		
3728-1-15	A990953A	<u>FLOOR TILE</u> Homogeneous, Tan, Fibrous, Bound	CHRY	2%
		CHRY 2% VINYL 98 % CELL <1 %		
	A990953B	<u>MASTIC</u> Homogeneous, Black, Fibrous, Bound	CHRY	3%
		CHRY 3% VINYL 97 % CELL <1 %		
3728-1-16	A990954	<u>CEMENT FLOORING</u> Homogeneous, Red, Fibrous, Tightly Bound	CHRY	2%
		CHRY 2% BIND 98 % CELL <1 %		
3728-1-17	A990955	<u>FELT PAPER</u> Homogeneous, Black, Fibrous, Bound	ND	
		TAR 40 % CELL 60 %		

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Lab Code: A10-0683

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION						% ASBESTOS
3728-1-18	A990956	<u>MASTIC</u> Homogeneous, Brown, Fibrous, Bound	MAST	95 %	CELL	5 %		ND
3728-1-19	A990957A	<u>FLOOR TILE</u> Homogeneous, Beige, Fibrous, Bound	CHRY 5% VINYL	95 %	CELL	<1 %		CHRY 5%
	A990957B	<u>MASTIC</u> Homogeneous, Black, Fibrous, Bound	CHRY 3% VINYL	97 %	CELL	<1 %		CHRY 3%
3728-1-20	A990958	<u>SHEET FLOORING</u> Heterogeneous, White, Fibrous, Bound	VINYL BIND	60 % 20 %	CELL FBGL	20 % <1 %		ND
3728-1-21	A990959A	<u>SHEET FLOORING</u> Heterogeneous, White, Fibrous, Bound	VINYL BIND	60 % 20 %	CELL FBGL	20 % <1 %		ND
3728-1-22	A990960A	<u>FLOOR TILE</u> Homogeneous, Black, Fibrous, Bound	CHRY 5% VINYL	95 %	CELL	<1 %		CHRY 5%
	A990960B	<u>MASTIC</u> Homogeneous, Black, Fibrous, Bound	MAST	95 %	CELL	5 %		ND

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Lab Code: A10-0683

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS			
3728-1-23	A990961 Homogeneous,	<u>ATTIC INSULATION</u> Grey, Fibrous, Loosely Bound	FBGL	100 %	ND	
3728-1-24	A990962 Heterogeneous,	<u>CEILING TILE</u> White, Tan, Fibrous, Loosely Bound	PERL PAINT	20 % 5 %	CELL FBGL	60 % 15 %
3728-1-25	A990963 Heterogeneous,	<u>DRYWALL JOINT COMPOUND</u> White, Fibrous, Bound	CHRY PLAS PAINT	2% 95 % 3 %	CELL	<1 %
3728-1-26	A990964 Heterogeneous,	<u>CAULKING</u> White, Non-fibrous, Bound	CAULK PAINT	95 % 5 %	CELL	<1 %
3728-M-27	A990965 Homogeneous,	<u>CEMENT</u> Grey, Fibrous, Bound	CHRY BIND	3% 97 %	CELL	<1 %
3728-R-28	A990966 Heterogeneous,	<u>ROOF SHINGLE</u> Grey, Black, Fibrous, Bound	TAR GRAV	65 % 25 %	FBGL CELL	10 % <1 %
3728-R-29	A990967 Homogeneous,	<u>ROOF FELT</u> Black, Fibrous, Bound	TAR	40 %	CELL	60 %

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Lab Code: A10-0683

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3728-R-30	A990968	<u>ROOF SHINGLE</u> Heterogeneous, Grey, Black, Fibrous, Bound	ND
		TAR 65 % FBGL 10 % GRAV 25 % CELL <1 %	
3728-R-31	A990969	<u>ROOF FELT</u> Homogeneous, Black, Fibrous, Bound	ND
		TAR 40 % CELL 60 %	
3728-E-32	A990970	<u>CAULKING</u> Heterogeneous, White, Non-fibrous, Bound	ND
		CAULK 100 % CELL <1 % PAINT <1 %	
3728-E-33	A990971	<u>CAULKING</u> Heterogeneous, White, Non-fibrous, Bound	ND
		CAULK 100 % CELL <1 % PAINT <1 %	

**The following definitions apply to the abbreviations used in the ASBESTOS BULK ANALYSIS REPORT:**

CHRY = Chrysotile	CELL = Cellulose	DEBR = Debris
AMOS = Amosite	FBGL = Fibrous Glass	BIND = Binder
CROC = Crocidolite	CACO = Calcium Carbonate	SILI = Silicates
TREM = Tremolite	SYNT = Synthetics	GRAV = Gravel
ANTH = Anthophyllite	WOLL = Wollastonite	MAST = Mastic
ACTN = Actinolite	CERWL = Ceramic Wool	PLAS = Plaster
N D = None Detected	NTREM = Non-Asbestiform Tremolite	PERL = Perlite
NANTH = Non-Asbestiform Anthophyllite	FBGY = Fibrous Gypsum	RUBR = Rubber
		VER = Vermiculite

**CLIENT:** US Army Corps of Engineers - Savannah District - EMU9

**PROJECT:** Ft Bragg Building A-3728; 10178

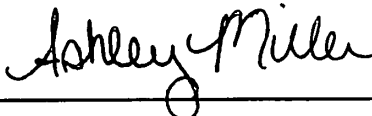
**CEI LAB CODE:** A10-0683

Stereoscopic microscopy and polarized light microscopy coupled with dispersion staining is the analytical technique used for sample identification. The percentage of each component is visually estimated by volume. These results pertain only to the samples analyzed. The samples were analyzed as submitted by the client and may not be representative of the larger material in question. Unless notified in writing to return samples, Carolina Environmental, Inc. will discard all bulk samples after 30 days.

Many vinyl floor tiles have been manufactured using greater than 1% asbestos. Often the asbestos was milled to a fiber size below the detection limit of polarized light microscopy. Therefore, a "None Detected" (ND) reading on vinyl floor tile does not necessarily exclude the presence of asbestos. Transmission electron microscopy provides a more conclusive form of analysis for vinyl floor tiles.

It is certified by the signature below that Carolina Environmental, Inc. is accredited by the National Voluntary Accreditation Program (NVLAP) for the analysis of asbestos in bulk materials. The accredited test method is EPA / 600 / M4-82 / 020 for the analysis of asbestos in building materials. Procedures described in EPA / 600 / R-93 / 116 have been incorporated where applicable. The detection limit for the method is 0.1% (trace amount). Carolina Environmental, Inc.'s NVLAP accreditation number is #101768-0. This report is not to be used to claim product endorsement by NVLAP or any agency of the U. S. Government. This report and its contents are only valid when reproduced in full. Dust and soil analyses for asbestos using PLM are not covered under NVLAP accreditation.

**ANALYST**



**REVIEWED BY**



Tianbao Bai, Ph.D.  
Laboratory Director

**End of Report**

# **Appendix B**

## **Sample Chain of Custody Forms**



A10.0683 (33)  
A990929. A990971

**ASBESTOS CHAIN OF CUSTODY - US ARMY CORPS OF ENGINEERS**

Project: <b>Ft Bragg Building A-3728</b>	Job No.: <b>10178</b>
Sampler: <b>Tim Jones</b>	Analysis: <b>PLM</b>

DATE	FIELD ID	EMU ID	COMPONENTS/NOTES
1/22/2010	3728-1-1	62437	Textured ceiling surfacing
1/22/2010	3728-1-2	62438	Textured ceiling surfacing
1/22/2010	3728-1-3	62439	Textured ceiling surfacing
1/22/2010	3728-1-4	62440	Ceiling tile
1/22/2010	3728-1-5	62441	Gypsum board & joint compound
1/22/2010	3728-1-6	62442	Caulking material
1/22/2010	3728-1-7	62443	Caulking material
1/22/2010	3728-1-8	62444	Drywall joint compound
1/22/2010	3728-1-9	62445	Drywall joint compound
1/22/2010	3728-1-10	62446	Caulking material
1/22/2010	3728-1-11	62447	Drywall joint compound
1/22/2010	3728-1-12	62448	Floor tile & mastic
1/22/2010	3728-1-13	62449	Red cement flooring
1/22/2010	3728-1-14	62450	Felt paper
1/22/2010	3728-1-15	62451	Floor tile & mastic
1/22/2010	3728-1-16	62452	Red cement flooring
1/22/2010	3728-1-17	62453	Felt paper
1/22/2010	3728-1-18	62454	Black mastic?
1/22/2010	3728-1-19	62455	Floor tile & mastic
1/22/2010	3728-1-20	62456	Sheet vinyl flooring
1/22/2010	3728-1-21	62457	Sheet vinyl flooring
1/22/2010	3728-1-22	62458	Floor tile & mastic

Relinquished By	Date	Time	Received By	Date	Time
<i>Tim Jones</i>	<i>1-29-10</i>	<i>1400</i>	<i>Kurtis Pitt</i>	<i>02/01/10</i>	<i>3:20 PM</i>

--

A10. 0683

Project:	<b>Ft Bragg Building A-3728</b>	Job No.:	<b>10178</b>
Sampler:	Tim Jones	Analysis:	PLM

[illegible]

Relinquished By	Date	Time	Received By	Date	Time
<i>Tim Jon</i>	<i>1-29-10</i>	<i>1400</i>			

--

# **Appendix C**

## **Certifications & Accreditations**



North Carolina Department of Health and Human Services  
Division of Public Health · Epidemiology Section  
Occupational and Environmental Epidemiology Branch  
1912 Mail Service Center · Raleigh, North Carolina 27699-1912  
Tel 919-707-5950 · Fax 919-870-4808

Beverly Eaves Perdue, Governor  
Lanier M. Cansler, Secretary

Jeffrey P. Engel, M.D.  
State Health Director

October 26, 2009

Timothy A Jones  
4411 Smoke Stone Court  
Marietta, GA 30062

Dear Mr. Jones:

Based upon the review of your accreditation application, the Health Hazards Control Unit (HHCU) has determined that you have fulfilled the requirements and are eligible for asbestos accreditation as a(n) INSPECTOR. Your assigned North Carolina accreditation number is 12210, which is reflected on your enclosed North Carolina Accreditation card. Please be sure to take this card with you to any asbestos work site where you are employed. The State requires that all persons conducting asbestos abatement or asbestos management activities be accredited and have their identification card on site.

Your North Carolina Inspector accreditation will expire on SEPTEMBER 30, 2010. It is NOT the policy of the HHCU to issue renewal notices. If you wish to continue working as a(n) Inspector after this expiration date, you must successfully complete the required training and submit a completed application to this office prior to September 30, 2010. If you should continue to perform asbestos management activities as a(n) Inspector without a valid North Carolina accreditation, you will be in violation of State regulations and may be cited for noncompliance.

Sincerely,

A handwritten signature in black ink, appearing to read "Marita E Cheek".

Marita E Cheek  
Accreditation/Certification Secretary  
Health Hazards Control Unit

Enclosure

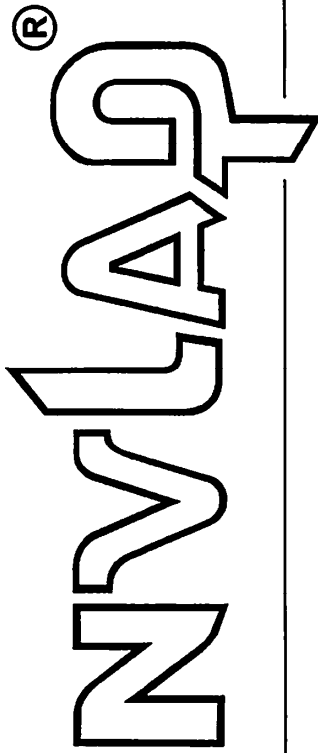


North Carolina Public Health  
Working for a healthier and safer North Carolina  
Everywhere. Everyday. Everybody.

Location: 5505 Six Forks Road, 2nd Floor, Room D-1 · Raleigh, N.C. 27609



United States Department of Commerce  
National Institute of Standards and Technology



## Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 101768-0

**Carolina Environmental, Inc.**  
Cary, NC

is accredited by the National Voluntary Laboratory Accreditation Program for specific services,  
listed on the Scope of Accreditation, for:

### BULK ASBESTOS FIBER ANALYSIS

*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.  
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality  
management system (refer to joint ISO-ILAC-IAF Communiqué dated January 2009).*

2009-04-01 through 2010-03-31

Effective dates



*Sally J. Bruce*  
For the National Institute of Standards and Technology

NVLAP-01C (REV. 2009-01-28)



**US Army Corps  
of Engineers®**

# **Savannah District Environmental and Materials Unit**

## ***Hazardous Building Materials Survey***

# **Building No. A-3728 Fort Bragg, North Carolina**

**Prepared by Timothy A. Jones**



The contents of this report are not to be used for advertising, publication, or promotional purposes. Citation of trade names does not constitute an official endorsement or approval of the use of such commercial products.

The findings of this report are not to be construed as an official Department of the Army position, unless so designated by other authorized documents.

**Hazardous Building Materials Survey**

**January 2010**

# **Building No. A-3728 Fort Bragg, North Carolina**

by Timothy A. Jones

Final Report

**Prepared for**

**U.S. Army Corps of Engineers  
Savannah District**



# Hazardous Building Materials Survey Report

---

## Introduction

### Background

Building A-3728 is a 1700 square foot single story wood frame structure with a wood frame floor system topped with red cement and vinyl floor tiles. The roof system is asphalt shingles over wood decking. Interior ceilings are older gypsum board with newer metal framed suspended tiles added in some rooms. Interior walls are wood framed covered with gypsum drywall. Exterior walls are wood siding covered with newer metal siding. Windows are newer metal replacements. The building was reportedly built in 1941.

## Description of study

### Investigation

This report documents the hazardous building materials survey of Building No. A-3728 at Fort Bragg, North Carolina conducted on 22 January 2010 by USACE Savannah District employees Tim Jones and Jason Hart and includes only building materials located at the time of inspection. This survey was conducted in general accordance with the Statement of Services for Hazardous Building Material Inspections developed by Ray Willingham, retired, USACE Savannah District. The investigation includes a visual identification and location of such items as: fluorescent and mercury-vapor lights; battery back-up exit lights and emergency lights; mercury-containing thermostats and switches; refrigerant containing air conditioners, water fountains and ice makers; above and below ground storage tanks; transformers; built in chemical type fire suppression systems; smoke detectors; and lead building materials excluding lead based paint. Other hazardous building materials not listed above may also be included at the discretion of the inspectors. Asbestos is excluded from this inspection as it is covered separately in an asbestos inspection report.

## Conclusions

The following information gathered during the survey of Building A-3728 is presented in attached information:

- a. Light Count:* The fluorescent and mercury vapor light count results are presented in Table 1.
- b. Lead Building Materials:* Inspection of the building revealed lead in the cast iron plumbing drainage and vent piping system used as pipe joints. Lead flashings are used at the pipe penetrations through the roof. Details are outlined in Table 2.
- c. Fire Extinguishers:* (4) Fire Extinguishers were located within the building.
- d. Mercury Thermostat:* (1) Mercury thermostat was found within the building.
- e. Compressed Refrigerant Gas:* (5) Window Air conditioning units were located within the building. These units are assumed to contain refrigerant gas that should be recovered prior to demolition.

# Tables

**TABLE 1**  
**FORT BRAGG BUILDING A-3728**  
**FLUORESCENT AND MERCURY LIGHT FIXTURES**

AREA IDENTIFICATION	# & TYPE LIGHTS PRESENT	DESCRIPTION OF LIGHTS
Interior	20	2 Bulb, 4 Foot Fluorescent Fixtures

**TABLE 2**  
**FORT BRAGG BUILDING A-3728**  
**LEAD BUILDING COMPONENTS**

BUILDING COMPONENT	DESCRIPTION	LOCATION	ESTIMATED NUMBER
Lead Flashing	Roof flashing	Roof	1
Hot poured lead pipe joint	In plumbing drainage, waste and vent piping	Under building and in plumbing chase walls	25-35



**US Army Corps  
of Engineers®**

# **Savannah District Environmental and Materials Unit**

## **Building A-3732 Ft. Bragg, North Carolina**

**Prepared by Timothy A. Jones**



The contents of this report are not to be used for advertising, publication, or promotional purposes. Citation of trade names does not constitute an official endorsement or approval of the use of such commercial products.

The findings of this report are not to be construed as an official Department of the Army position, unless so designated by other authorized documents.

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**Asbestos Survey**

**January 2010**

# **Building A-3732 Fort Bragg, NC**

Prepared by Timothy A. Jones

Final report

**Prepared for US Army Corps of Engineers  
Savannah District**

# Asbestos Inspection Report

---

## Introduction

### Scope of the Investigation

This report documents the asbestos inspection and survey of Building A-3732 at Fort Bragg, North Carolina conducted on 22 January 2010 by Savannah District US Army Corps of Engineers employee Tim Jones. The survey was conducted in general accordance with the regulatory guidelines in the Asbestos Hazard Emergency Response Act (AHERA) (40 CFR Part 763 Subpart E Sections 763.80-763.88) and “Guidance for Controlling Asbestos-Containing Materials in Buildings” (Purple Book) (EPA publication number 560/5-85-024). Although not required by the AHERA guidelines, roof and other exterior miscellaneous materials were also inspected and sampled.

### Background

Building A-3732 is a 2000 square foot single story wood frame structure with a wood frame floor system with vinyl floor tiles and carpet. The roof system is asphalt shingles over wood decking. Interior ceilings are newer metal framed suspended tiles hung below older fiberboard and gypsum drywall ceilings. Interior walls are wood framed covered typically with two layers of gypsum drywall. Exterior walls are wood siding covered with newer metal siding. Windows are newer metal replacements. The building was reportedly built in 1941.

## Description of study

### Investigation

All accessible areas of Building A-3732 were visually inspected for suspected asbestos containing materials (ACM) by a North Carolina accredited inspector. A copy of the inspector’s accreditation certificate is included in Appendix C. Bulk samples of suspect ACM’s were collected. This report details ACM as identified at the time of inspection only.

The bulk samples were analyzed by Carolina Environmental, Inc. The laboratory is accredited by the National Voluntary Laboratory Accredited Program (NVLAP Accreditation sponsored by the National Institute of Standards and Technology (NIST)). A copy of their accreditation certificates is included in Appendix C. The samples were



analyzed by the accepted method of polarized light microscopy (PLM) using EPA's Method EPA/M4-82-020. The laboratory's analytical report is included in Appendix A.

In compliance with the AHERA regulations, material is considered an Asbestos Containing Material (ACM) when it contains greater than one percent asbestos. Likewise, in this report, any material containing concentrations greater than one percent asbestos will be considered "positive". In some instances, materials containing one percent asbestos, or less, may be assumed to be an asbestos containing material at the discretion of the inspector. A narrative discussion of the AHERA ACM types (i.e., thermal systems insulation, miscellaneous and surfacing materials) found in Building A-3732 is included in this report where relevant. Bulk sample information appears on Table 1. Estimated quantities of individual asbestos containing materials appear on Table 2. Material characterization of asbestos containing materials appears on Table 3. The approximate location where each bulk sample was obtained is shown on the building floor plans, which appear as Figures. Positive ACM samples are highlighted on the floor plan Figures with their numbers enclosed in squares; samples with negative analytical results for asbestos are indicated with their numbers enclosed in circles. Most homogeneous areas are highlighted on the Figures. It is reasonable to assume that all materials similar to those testing positive, also contain positive amounts of asbestos and should be treated as such.

## Conclusions

### Thermal Systems Insulation (TSI)

TSI is insulation material applied to pipes, fittings, tanks, ducts, or for other interior structural components to prevent heat loss or gain, or water condensation, or for other purposes.

No asbestos containing TSI was located in Building A-3732.

### Miscellaneous Materials

Miscellaneous materials include building material on structural components, structural members or fixtures, such as floor and ceiling tiles, and do not include surfacing or TSI. In the past, there were a great number of miscellaneous building materials that had asbestos fibers added to them during the manufacturing process to increase durability and fireproofing qualities. The following suspect miscellaneous materials at Building No. A-3732 were found to contain or are assumed to contain asbestos:

*Drywall Joint Compound:* Drywall joint compound applied to the older gypsum board layer behind newer gypsum board on the walls throughout the majority of the building contains asbestos. Drywall joint compound applied to the patched areas of the old ceiling above the newer suspended ceiling contains asbestos. The majority of

this old ceiling is unfinished fiberboard. - (Refer to Tables 1, 2 and 3 for specific information and Figure 1 for sample locations).

### **Surfacing**

Surfacing material is friable material that is sprayed on, troweled on, or otherwise applied to surfaces for decorative or other purposes.

No surfacing materials were located in Building A-3732.

**TABLE 1**  
**SUSPECT ACM SAMPLES**  
**Ft. BRAGG, BUILDING A-3732**

<b>FIELD ID</b>	<b>DESCRIPTION</b>	<b>LOCATION</b>	<b>ASBESTOS TYPE &amp; %</b>
<b>3732-1-1</b>	<b>Drywall joint compound</b>	<b>Room 101, above suspended ceiling applied to gypsum board patch on old ceiling</b>	<b>2% chrysotile</b>
3732-1-2	Fiberboard	Room 101, old ceiling above newer suspended ceiling tiles	No Asbestos Detected
3732-1-3	Ceiling tile	Room 101, typical tile	No Asbestos Detected
3732-1-4	Gypsum board & joint compound	Room 101, perimeter wall, newer outer layer of gypsum board	No Asbestos Detected
<b>3732-1-5</b>	<b>Gypsum board &amp; joint compound</b>	<b>Room 101, perimeter wall, older gypsum board layer behind sample 4</b>	<b>Joint compound 2% chrysotile, drywall NAD</b>
3732-1-6	Drywall joint compound	Room 110, partition wall, newer outer layer of gypsum board	No Asbestos Detected
<b>3732-1-7</b>	<b>Gypsum board &amp; joint compound</b>	<b>Room 110, partition wall, older gypsum board layer behind sample 6</b>	<b>Joint compound 2% chrysotile, drywall NAD</b>
3732-1-8	Ceiling tile	Room 110, typical tile	No Asbestos Detected
<b>3732-1-9</b>	<b>Drywall joint compound</b>	<b>Room 106, above suspended ceiling applied to gypsum board patch on old ceiling</b>	<b>2% chrysotile</b>
3732-1-10	Drywall joint compound	<b>Room 108, perimeter wall, older gypsum board layer behind sample 4</b>	No Asbestos Detected
<b>3732-1-11</b>	<b>Drywall joint compound</b>	Room 108, partition wall, newer outer layer of gypsum board	<b>2% chrysotile</b>
3732-1-12	Vinyl base molding & adhesive	Room 108	No Asbestos Detected
3732-1-13	Caulking material	Corridor 111, around door frame	No Asbestos Detected
3732-1-14	Caulking material	Corridor 111, around door frame	No Asbestos Detected
3732-1-15	Tan 12" X 12" floor tile & mastic	Room 109	No Asbestos Detected
3732-1-16	Green sheet vinyl flooring	Room 109, under sample 15	No Asbestos Detected

3732-1-17	Duct sealer	Room 109 on return ductwork	No Asbestos Detected
3732-1-18	Green sheet vinyl flooring	Room 108, under carpet and plywood	No Asbestos Detected
3732-1-19	Green sheet vinyl flooring	Room 105, under carpet and plywood	No Asbestos Detected
3732-1-20	Felt paper	Room 105, under sample 19	No Asbestos Detected
3732-1-21	12" X 12" tan floor tile & yellow adhesive	Room 101	No Asbestos Detected
3732-1-22	Vinyl base molding & adhesive	Room 104	No Asbestos Detected
3732-R-23	Roof shingle	Roof	No Asbestos Detected
3732-R-24	Roofing felt	Roof, under shingles	No Asbestos Detected
3732-R-25	Roof shingle	Roof	No Asbestos Detected
3732-R-26	Roofing felt	Roof, under shingles	No Asbestos Detected
3732-E-27	Caulking material	Exterior, between metal window frame and metal siding	No Asbestos Detected
3732-E-28	Caulking material	Exterior, between metal window frame and metal siding	No Asbestos Detected

Samples testing positive for asbestos indicated in **BOLD** type

NAD = No Asbestos Detected

**TABLE 2**  
**ACM QUANTITY SUMMARY**  
**Ft. BRAGG, BUILDING A-3732**

Homogeneous Area Descriptions	Units	Functional Space Descriptions								
		Interior Walls	Interior Ceiling							Totals
Drywall joint compound	S.F.	4400	300							4700

**S.F. = Square Foot, L.F. = Linear Foot, C.F. = Cubic Foot**

**TABLE 3**  
**MATERIAL CHARACTERIZATION AND ASSESSMENT**  
**Ft. BRAGG, BUILDING A-3732**

MATERIAL		CHARACTERISTICS			ASSESSMENT	
Type	Description	Asbestos Yes/no/assumed	Quantity	Friable / Non-friable	Condition	Disturbance Potential
Miscellaneous	Drywall joint compound walls	Yes	4400 S.F.	Friable	Good	Low
Miscellaneous	Drywall joint compound ceiling	Yes	300 S.F.	Friable	Damaged	Moderate

**S.F. = Square Foot, L.F. = Linear Foot, C.F. = Cubic Foot**

Figure 1

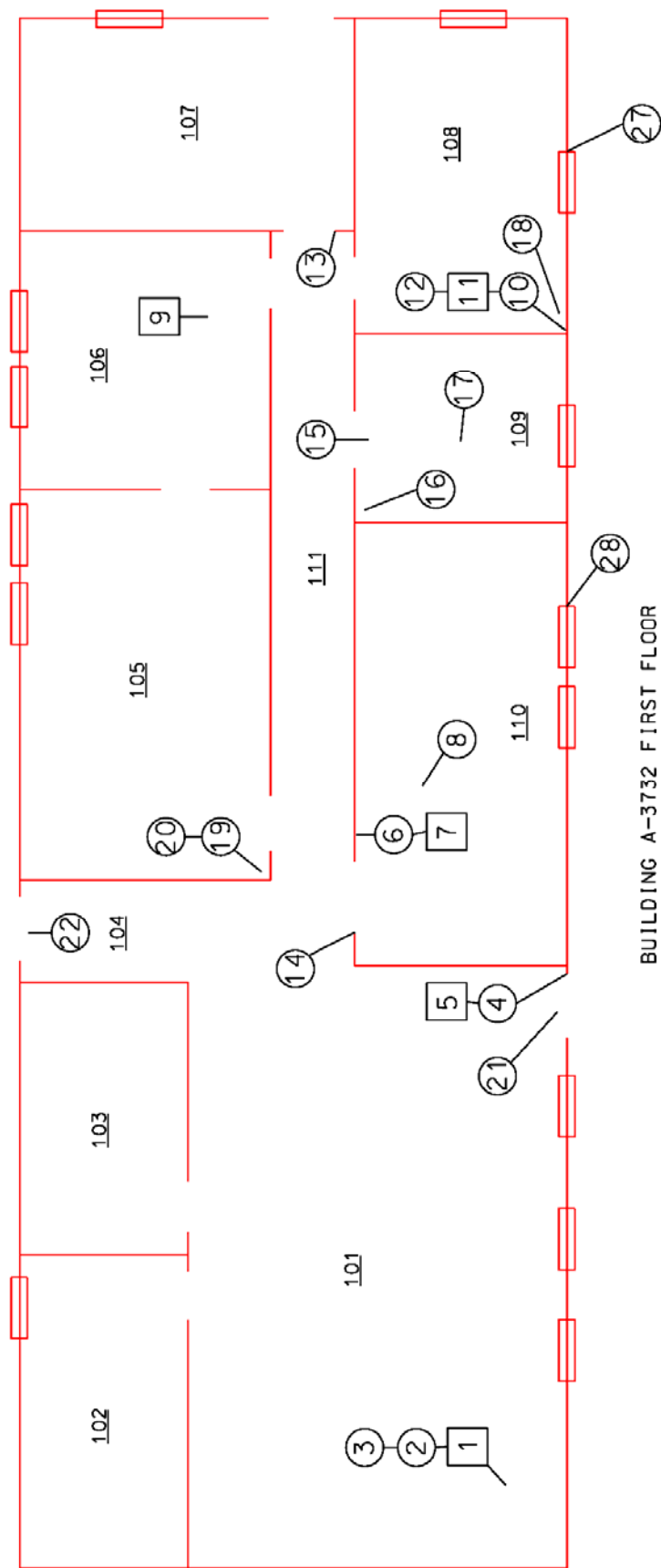
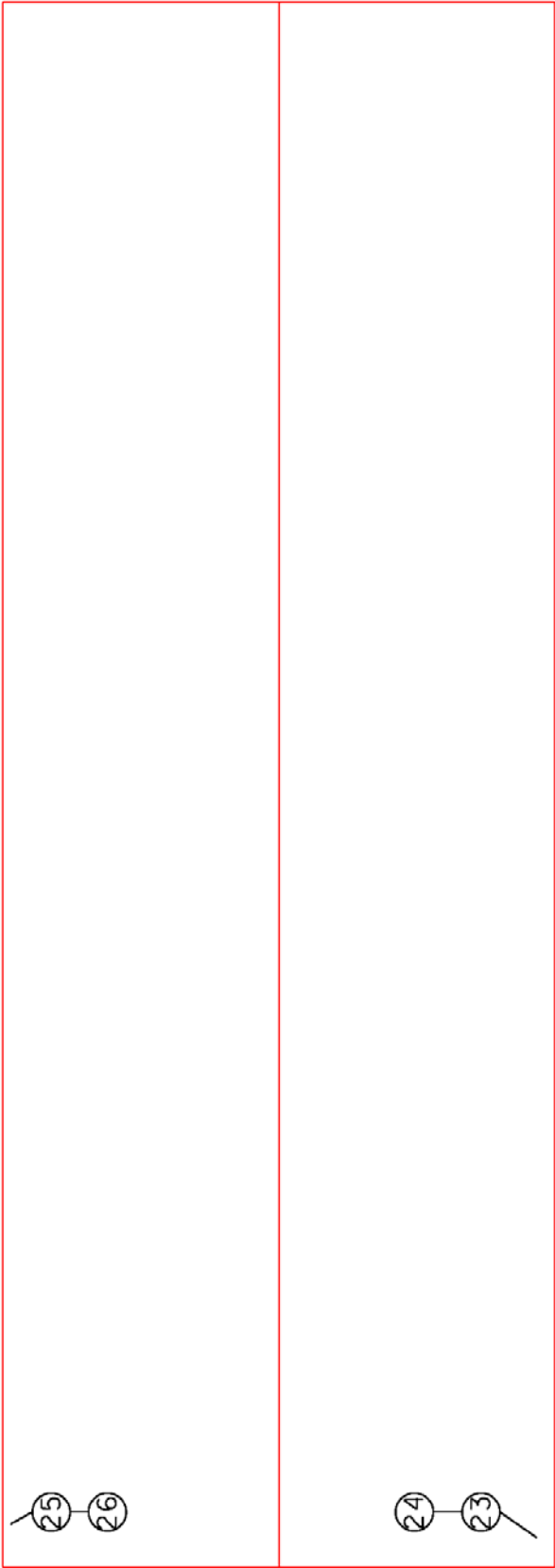


Figure 2



BUILDING A-3732 ROOF

# **Appendix A**

## **Analytical Report – Carolina Environmental, Inc.**



CAROLINA ENVIRONMENTAL, INC.  
107 New Edition Court, Cary, NC 27511  
Phone: (919) 481-1413 Fax: (919) 481-1442

## LABORATORY REPORT ASBESTOS BULK ANALYSIS

Client: **US Army Corps of Engineers - Savannah**  
**District - EMU9**  
200 North Cobb Parkway, Bldg. 400 Ste. 404  
Marietta, GA 30062

CEI Lab Code: A10-0682  
Received: 02-01-10  
Analyzed: 02-03-10  
Reported: 02-03-10  
Analyst: Erica Tucker

Project: Ft Bragg Building A-3732; 10178

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION						% ASBESTOS	
3732-1-1	A990911	<u>JOINT COMPOUND</u> Homogeneous, Tan, Fibrous, Bound						CHRY	2%
		CHRY	2%	MICA	10 %	CELL	<1 %		
				BIND	88 %				
3732-1-2	A990912	<u>FIBERBOARD</u> Heterogeneous, Brown, Fibrous, Bound						ND	
				PAINT	5 %	CELL	95 %		
3732-1-3	A990913	<u>CEILING TILE</u> Heterogeneous, White, Grey, Fibrous, Bound						ND	
				PAINT	<1 %	CELL	45 %		
				PERL	20 %	FBGL	35 %		
3732-1-4	A990914	<u>GYPSUM BOARD/JOINT COMPOUND</u> Heterogeneous, White, Fibrous, Bound						ND	
				GYPSUM	35 %	CELL	10 %		
				BIND	55 %				
				PAINT	<1 %				
3732-1-5	A990915	<u>GYPSUM BOARD/JOINT COMPOUND</u> Heterogeneous, White, Fibrous, Bound						CHRY	<1%
		CHRY	<1%	GYPSUM	35 %	CELL	10 %		
				BIND	55 %				
				PAINT	<1 %				
3732-1-6	A990916	<u>JOINT COMPOUND</u> Homogeneous, White, Fibrous, Bound						ND	
				MICA	10 %	CELL	<1 %		
				BIND	90 %				

2% chry in joint compound only, <1%  
chry in overall sample

CAROLINA ENVIRONMENTAL, INC.  
107 New Edition Court, Cary, NC 27511  
Phone: 919-481-1413 Fax: 919-481-1442

Project: Ft Bragg Building A-3732; 10178

Lab Code: A10-0682

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS			
3732-1-7	A990917	<u>GYPSUM BOARD/JOINT COMPOUND</u> Heterogeneous, White, Fibrous, Bound	CHRY	<1%		
2% chry in joint compound only, <1% chry in overall sample		CHRY <1% GYPSUM 35 % CELL 10 % BIND 55 % PAINT <1 %				
3732-1-8	A990918	<u>CEILING TILE</u> Heterogeneous, White, Grey, Fibrous, Bound				ND
		PAINT <1 % CELL 45 % PERL 20 % FBGL 35 %				
3732-1-9	A990919	<u>JOINT COMPOUND</u> Heterogeneous, Tan, Fibrous, Bound	CHRY	2%		
		CHRY 2% MICA 10 % CELL <1 % BIND 88 % PAINT <1 %				
3732-1-10	A990920	<u>JOINT COMPOUND</u> Homogeneous, White, Fibrous, Bound				ND
		MICA 10 % CELL <1 % BIND 90 %				
3732-1-11	A990921	<u>JOINT COMPOUND</u> Heterogeneous, Tan, Fibrous, Bound	CHRY	2%		
		CHRY 2% MICA 10 % CELL <1 % BIND 88 % PAINT <1 %				
3732-1-12	A990922A	<u>BASEBOARD</u> Homogeneous, Brown, Fibrous, Bound				ND
		MICA 10 % CELL <1 % VINYL 90 %				
	A990922B	<u>MASTIC</u> Homogeneous, White, Fibrous, Bound				ND
		MAST 100 % CELL <1 %				

CAROLINA ENVIRONMENTAL, INC.  
 107 New Edition Court, Cary, NC 27511  
 Phone: 919-481-1413 Fax: 919-481-1442

Project: Ft Bragg Building A-3732; 10178

Lab Code: A10-0682

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS			
3732-1-13	A990923	<u>CAULKING MATERIAL</u> Heterogeneous, White, Fibrous, Bound	CAULK	100 %	CELL	<1 %
			PAINT	<1 %		
3732-1-14	A990924	<u>CAULKING MATERIAL</u> Heterogeneous, White, Fibrous, Bound	CAULK	100 %	CELL	<1 %
			PAINT	<1 %		
3732-1-15	A990925A	<u>FLOOR TILE</u> Homogeneous, Brown, Tan, Fibrous, Bound	CACO	15 %	CELL	<1 %
			VINYL	85 %		
	A990925B	<u>MASTIC</u> Homogeneous, Tan, Fibrous, Bound	MAST	100 %	CELL	<1 %
3732-1-16	A990926	<u>SHEET VINYL FLOORING</u> Heterogeneous, Green, Fibrous, Bound	VINYL	90 %	CELL	10 %
3732-1-17	A990927	<u>DUCT SEALER</u> Homogeneous, Grey, Fibrous, Bound	MAST	97 %	CELL	3 %
3732-1-18	A990928	<u>SHEET VINYL FLOORING</u> Heterogeneous, Green, Fibrous, Bound	VINYL	90 %	CELL	10 %

CAROLINA ENVIRONMENTAL, INC.  
107 New Edition Court, Cary, NC 27511  
Phone: 919-481-1413 Fax: 919-481-1442

Project: Ft Bragg Building A-3732; 10178

Lab Code: A10-0682

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS		
3732-1-19	A990929	<u>SHEET VINYL FLOORING</u> Heterogeneous, Green, Fibrous, Bound	ND		
		VINYL 90 % CELL 10 %			
3732-1-20	A990930	<u>FELT PAPER</u> Homogeneous, Brown, Fibrous, Bound	ND		
		MAST <1 % CELL 95 % BIND 5 %			
3732-1-21	A990931A	<u>FLOOR TILE</u> Homogeneous, Brown, Tan, Fibrous, Bound	ND		
		CACO 15 % CELL <1 % VINYL 85 %			
	A990931B	<u>MASTIC</u> Homogeneous, Yellow, Fibrous, Bound	ND		
		MAST 100 % CELL <1 %			
3732-1-22	A990932A	<u>BASEBOARD</u> Homogeneous, Brown, Fibrous, Bound	ND		
		MICA 10 % CELL <1 % VINYL 90 %			
	A990932B	<u>MASTIC</u> Homogeneous, White, Fibrous, Bound	ND		
		MAST 100 % CELL <1 %			
3732-1-23	A990933	<u>ROOF SHINGLE</u> Heterogeneous, Black, Fibrous, Bound	ND		
		GRAV 15 % FBGL 25 % TAR 60 %			

CAROLINA ENVIRONMENTAL, INC.  
107 New Edition Court, Cary, NC 27511  
Phone: 919-481-1413 Fax: 919-481-1442

Project: Ft Bragg Building A-3732; 10178

Lab Code: A10-0682

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS		
3732-1-24	A990934	<u>ROOFING FELT</u> Homogeneous, Black, Fibrous, Bound	ND		
		TAR 50 % CELL 50 %			
3732-1-25	A990935	<u>ROOF SHINGLE</u> Heterogeneous, Black, Fibrous, Bound	ND		
		GRAV 15 % FBGL 25 % TAR 60 %			
3732-1-26	A990936	<u>ROOFING FELT</u> Homogeneous, Black, Fibrous, Bound	ND		
		TAR 50 % CELL 50 %			
3732-1-27	A990937	<u>CAULKING MATERIAL</u> Homogeneous, White, Fibrous, Bound	ND		
		CAULK 100 % CELL <1 %			
3732-1-28	A990938	<u>CAULKING MATERIAL</u> Homogeneous, White, Fibrous, Bound	ND		
		CAULK 100 % CELL <1 %			

**The following definitions apply to the abbreviations used in the ASBESTOS BULK ANALYSIS REPORT:**

CHRY = Chrysotile	CELL = Cellulose	DEBR = Debris
AMOS = Amosite	FBGL = Fibrous Glass	BIND = Binder
CROC = Crocidolite	CACO = Calcium Carbonate	SILI = Silicates
TREM = Tremolite	SYNT = Synthetics	GRAV = Gravel
ANTH = Anthophyllite	WOLL = Wollastonite	MAST = Mastic
ACTN = Actinolite	CERWL = Ceramic Wool	PLAS = Plaster
N D = None Detected	NTREM = Non-Asbestiform Tremolite	PERL = Perlite
NANTH = Non-Asbestiform Anthophyllite	FBGY = Fibrous Gypsum	RUBR = Rubber
		VER = Vermiculite

---

**CLIENT:** US Army Corps of Engineers - Savannah District - EMU9

**PROJECT:** Ft Bragg Building A-3732; 10178

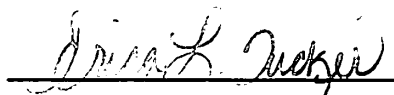
**CEI LAB CODE:** A10-0682

Stereoscopic microscopy and polarized light microscopy coupled with dispersion staining is the analytical technique used for sample identification. The percentage of each component is visually estimated by volume. These results pertain only to the samples analyzed. The samples were analyzed as submitted by the client and may not be representative of the larger material in question. Unless notified in writing to return samples, Carolina Environmental, Inc. will discard all bulk samples after 30 days.

Many vinyl floor tiles have been manufactured using greater than 1% asbestos. Often the asbestos was milled to a fiber size below the detection limit of polarized light microscopy. Therefore, a "None Detected" (ND) reading on vinyl floor tile does not necessarily exclude the presence of asbestos. Transmission electron microscopy provides a more conclusive form of analysis for vinyl floor tiles.

It is certified by the signature below that Carolina Environmental, Inc. is accredited by the National Voluntary Accreditation Program (NVLAP) for the analysis of asbestos in bulk materials. The accredited test method is EPA / 600 / M4-82 / 020 for the analysis of asbestos in building materials. Procedures described in EPA / 600 / R-93 / 116 have been incorporated where applicable. The detection limit for the method is 0.1% (trace amount). Carolina Environmental, Inc.'s NVLAP accreditation number is #101768-0. This report is not to be used to claim product endorsement by NVLAP or any agency of the U. S. Government. This report and its contents are only valid when reproduced in full. Dust and soil analyses for asbestos using PLM are not covered under NVLAP accreditation.

**ANALYST**



**REVIEWED BY**



Tianbao Bai, Ph.D.  
Laboratory Director

**End of Report**

# **Appendix B**

## **Sample Chain of Custody Forms**

A10.0682 (28)  
A990911.A990938

**ASBESTOS CHAIN OF CUSTODY - US ARMY CORPS OF ENGINEERS**

Project: <b>Ft Bragg Building A-3732</b>	Job No.: <b>10178</b>
Sampler: <b>Tim Jones</b>	Analysis: <b>PLM</b>

DATE	FIELD ID	EMU ID	COMPONENTS/NOTES
1/22/2010	3732-1-1	62470	Drywall joint compound
1/22/2010	3732-1-2	62471	Fiberboard
1/22/2010	3732-1-3	62472	Ceiling tile
1/22/2010	3732-1-4	62473	Gypsum board & joint compound
1/22/2010	3732-1-5	62474	Gypsum board & joint compound
1/22/2010	3732-1-6	62475	Drywall joint compound
1/22/2010	3732-1-7	62476	Gypsum board & joint compound
1/22/2010	3732-1-8	62477	Ceiling tile
1/22/2010	3732-1-9	62478	Drywall joint compound
1/22/2010	3732-1-10	62479	Drywall joint compound
1/22/2010	3732-1-11	62480	Drywall joint compound
1/22/2010	3732-1-12	62481	Vinyl base molding & adhesive
1/22/2010	3732-1-13	62482	Caulking material
1/22/2010	3732-1-14	62483	Caulking material
1/22/2010	3732-1-15	62484	Floor tile & mastic
1/22/2010	3732-1-16	62485	Sheet vinyl flooring
1/22/2010	3732-1-17	62486	Duct sealer
1/22/2010	3732-1-18	62487	Sheet vinyl flooring
1/22/2010	3732-1-19	62488	Sheet vinyl flooring
1/22/2010	3732-1-20	62489	Felt paper
1/22/2010	3732-1-21	62490	Floor tile & mastic
1/22/2010	3732-1-22	62491	Vinyl base molding & adhesive

Relinquished By	Date	Time	Received By	Date	Time
<i>Tim Jones</i>	<i>1-29-10</i>	<i>1400</i>	<i>Kurtis Smith</i>	<i>02/01/10</i>	<i>3:20 PM</i>

--



## ASBESTOS CHAIN OF CUSTODY - US ARMY CORPS OF ENGINEERS

Project: <b>Ft Bragg Building A-3732</b>	Job No.: <b>10178</b>
Sampler: <b>Tim Jones</b>	Analysis: <b>PLM</b>

[illegible]

Relinquished By	Date	Time	Received By	Date	Time
<i>Trin Go</i>	<i>1-29-10</i>	<i>1400</i>			

--

# **Appendix C**

## **Certifications & Accreditations**



North Carolina Department of Health and Human Services  
Division of Public Health · Epidemiology Section  
Occupational and Environmental Epidemiology Branch  
1912 Mail Service Center · Raleigh, North Carolina 27699-1912  
Tel 919-707-5950 · Fax 919-870-4808

Beverly Eaves Perdue, Governor  
Lanier M. Cansler, Secretary

Jeffrey P. Engel, M.D.  
State Health Director

October 26, 2009

Timothy A Jones  
4411 Smoke Stone Court  
Marietta, GA 30062

Dear Mr. Jones:

Based upon the review of your accreditation application, the Health Hazards Control Unit (HHCUC) has determined that you have fulfilled the requirements and are eligible for asbestos accreditation as a(n) INSPECTOR. Your assigned North Carolina accreditation number is 12210, which is reflected on your enclosed North Carolina Accreditation card. Please be sure to take this card with you to any asbestos work site where you are employed. The State requires that all persons conducting asbestos abatement or asbestos management activities be accredited and have their identification card on site.

Your North Carolina Inspector accreditation will expire on SEPTEMBER 30, 2010. It is NOT the policy of the HHCUC to issue renewal notices. If you wish to continue working as a(n) Inspector after this expiration date, you must successfully complete the required training and submit a completed application to this office prior to September 30, 2010. If you should continue to perform asbestos management activities as a(n) Inspector without a valid North Carolina accreditation, you will be in violation of State regulations and may be cited for noncompliance.

Sincerely,

A handwritten signature in black ink, appearing to read "Marita E Cheek".

Marita E Cheek  
Accreditation/Certification Secretary  
Health Hazards Control Unit

Enclosure

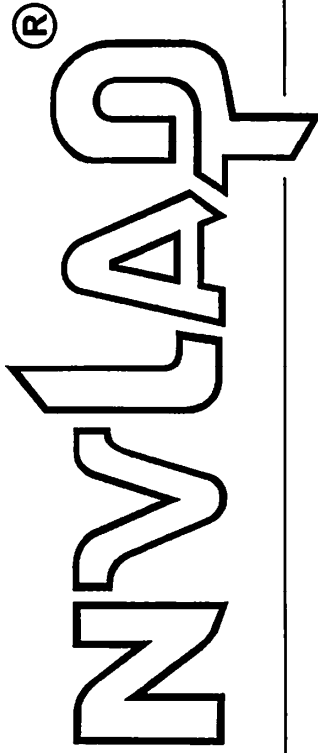


North Carolina Public Health  
Working for a healthier and safer North Carolina  
Everywhere. Everyday. Everybody.

Location: 5505 Six Forks Road, 2nd Floor, Room D-1 · Raleigh, N.C. 27609



United States Department of Commerce  
National Institute of Standards and Technology



# Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 101768-0

**Carolina Environmental, Inc.**  
Cary, NC

is accredited by the National Voluntary Laboratory Accreditation Program for specific services,  
listed on the Scope of Accreditation, for:

## BULK ASBESTOS FIBER ANALYSIS

*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.  
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality  
management system (refer to joint ISO-ILAC-IAF Communiqué dated January 2009).*

2009-04-01 through 2010-03-31

Effective dates



*Sally J. Bruce*  
For the National Institute of Standards and Technology

NVLAP-01C (REV. 2009-01-28)



**US Army Corps  
of Engineers®**

**Savannah District  
Environmental and Materials Unit**

*Hazardous Building Materials Survey*

**Building No. A-3732  
Fort Bragg, North Carolina**

Prepared by Timothy A. Jones



The contents of this report are not to be used for advertising, publication, or promotional purposes. Citation of trade names does not constitute an official endorsement or approval of the use of such commercial products.

The findings of this report are not to be construed as an official Department of the Army position, unless so designated by other authorized documents.

**Hazardous Building Materials Survey**

**January 2010**

# **Building No. A-3732 Fort Bragg, North Carolina**

by Timothy A. Jones

Final Report

**Prepared for**

**U.S. Army Corps of Engineers  
Savannah District**

# Hazardous Building Materials Survey Report

---

## Introduction

### Background

Building A-3732 is a 2000 square foot single story wood frame structure with a wood frame floor system with vinyl floor tiles and carpet. The roof system is asphalt shingles over wood decking. Interior ceilings are newer metal framed suspended tiles hung below older fiberboard and gypsum drywall ceilings. Interior walls are wood framed covered typically with two layers of gypsum drywall. Exterior walls are wood siding covered with newer metal siding. Windows are newer metal replacements. The building was reportedly built in 1941.

## Description of study

### Investigation

This report documents the hazardous building materials survey of Building No. A-3732 at Fort Bragg, North Carolina conducted on 22 January 2010 by USACE Savannah District employees Tim Jones and Jason Hart and includes only building materials located at the time of inspection. This survey was conducted in general accordance with the Statement of Services for Hazardous Building Material Inspections developed by Ray Willingham, retired, USACE Savannah District. The investigation includes a visual identification and location of such items as: fluorescent and mercury-vapor lights; battery back-up exit lights and emergency lights; mercury-containing thermostats and switches; refrigerant containing air conditioners, water fountains and ice makers; above and below ground storage tanks; transformers; built in chemical type fire suppression systems; smoke detectors; and lead building materials excluding lead based paint. Other hazardous building materials not listed above may also be included at the discretion of the inspectors. Asbestos is excluded from this inspection as it is covered separately in an asbestos inspection report.



## Conclusions

The following information gathered during the survey of Building A-3732 is presented in attached information:

- a. Light Count:* The fluorescent and mercury vapor light count results are presented in Table 1.
- b. Lead Building Materials:* Inspection of the building revealed lead in the cast iron plumbing drainage and vent piping system used as pipe joints. Details are outlined in Table 2.
- c. Fire Extinguishers:* One portable fire extinguisher was located in the building.
- d. Mercury Thermostat:* One mercury thermometer was found within the building.
- e. Compressed Refrigerant Gas:* One small central air conditioner was located within the building. One refrigerated drinking fountain and one refrigerator were located in the building. These units are assumed to contain refrigerant gas that should be recovered prior to demolition.

# Tables

**TABLE 1**  
**FORT BRAGG BUILDING A-3732**  
**FLUORESCENT AND MERCURY LIGHT FIXTURES**

<b>AREA IDENTIFICATION</b>	<b># &amp; TYPE LIGHTS PRESENT</b>	<b>DESCRIPTION OF LIGHTS</b>
Interior	22	2 Bulb, 4 Foot Fluorescent Fixtures
Interior	2	Small screw in fluorescent bulbs
Interior	3	Battery backup exit lights
Interior	2	Cases of 4 foot long fluorescent bulbs

**TABLE 2**  
**FORT BRAGG BUILDING A-3732**  
**LEAD BUILDING COMPONENTS**

<b>BUILDING COMPONENT</b>	<b>DESCRIPTION</b>	<b>LOCATION</b>	<b>ESTIMATED NUMBER</b>
Hot poured lead pipe joint	In plumbing drainage, waste and vent piping	Under building and in plumbing chase walls	25-35



**US Army Corps  
of Engineers®**

# **Savannah District Environmental and Materials Unit**

## **Building A-3734 Ft. Bragg, North Carolina**

**Prepared by Timothy A. Jones**



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The findings of this report are not to be construed as an official Department of the Army position, unless so designated by other authorized documents.

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**Asbestos Survey**

**January 2010**

# **Building A-3734 Fort Bragg, NC**

Prepared by Timothy A. Jones

Final report

**Prepared for    US Army Corps of Engineers  
Savannah District**

# Asbestos Inspection Report

---

## Introduction

### Scope of the Investigation

This report documents the asbestos inspection and survey of Building A-3734 at Fort Bragg, North Carolina conducted on 25 January 2010 by Savannah District US Army Corps of Engineers employee Tim Jones. The survey was conducted in general accordance with the regulatory guidelines in the Asbestos Hazard Emergency Response Act (AHERA) (40 CFR Part 763 Subpart E Sections 763.80-763.88) and “Guidance for Controlling Asbestos-Containing Materials in Buildings” (Purple Book) (EPA publication number 560/5-85-024). Although not required by the AHERA guidelines, roof and other exterior miscellaneous materials were also inspected and sampled.

### Background

Building A-3734 is a 7700 square foot two story wood frame structure with a wood frame floor system covered with vinyl flooring and carpet. The roof system is asphalt shingles over wood decking. Interior ceilings are newer metal framed with suspended tiles. Interior walls are wood framed covered with gypsum drywall. Exterior walls are wood siding covered with newer metal siding. Windows are newer metal replacements. The building was reportedly built in 1941 though major renovations appear to have taken place relatively recently.

## Description of study

### Investigation

All accessible areas of Building A-3734 were visually inspected for suspected asbestos containing materials (ACM) by a North Carolina accredited inspector. A copy of the inspector’s accreditation certificate is included in Appendix C. Bulk samples of suspect ACM’s were collected. This report details ACM as identified at the time of inspection only.

The bulk samples were analyzed by Carolina Environmental, Inc. The laboratory is accredited by the National Voluntary Laboratory Accredited Program (NVLAP Accreditation sponsored by the National Institute of Standards and Technology (NIST)). A copy of their accreditation certificates is included in Appendix C. The samples were

analyzed by the accepted method of polarized light microscopy (PLM) using EPA's Method EPA/M4-82-020. The laboratory's analytical report is included in Appendix A.

In compliance with the AHERA regulations, material is considered an Asbestos Containing Material (ACM) when it contains greater than one percent asbestos. Likewise, in this report, any material containing concentrations greater than one percent asbestos will be considered "positive". In some instances, materials containing one percent asbestos, or less, may be assumed to be an asbestos containing material at the discretion of the inspector. A narrative discussion of the AHERA ACM types (i.e., thermal systems insulation, miscellaneous and surfacing materials) found in Building A-3734 is included in this report where relevant. Bulk sample information appears on Table 1. Estimated quantities of individual asbestos containing materials appear on Table 2. Material characterization of asbestos containing materials appears on Table 3. The approximate location where each bulk sample was obtained is shown on the building floor plans, which appear as Figures. Positive ACM samples are highlighted on the floor plan Figures with their numbers enclosed in squares; samples with negative analytical results for asbestos are indicated with their numbers enclosed in circles. Most homogeneous areas are highlighted on the Figures. It is reasonable to assume that all materials similar to those testing positive, also contain positive amounts of asbestos and should be treated as such.

## Conclusions

### Thermal Systems Insulation (TSI)

TSI is insulation material applied to pipes, fittings, tanks, ducts, or for other interior structural components to prevent heat loss or gain, or water condensation, or for other purposes.

No asbestos containing TSI was located in Building A-3734.

### Miscellaneous Materials

Miscellaneous materials include building material on structural components, structural members or fixtures, such as floor and ceiling tiles, and do not include surfacing or TSI. In the past, there were a great number of miscellaneous building materials that had asbestos fibers added to them during the manufacturing process to increase durability and fireproofing qualities. The following suspect miscellaneous materials at Building No. A-3734 were found to contain or are assumed to contain asbestos:

*Flooring Materials:* The upper layer of white sheet vinyl flooring, typically located under carpet, contains asbestos. Though the laboratory report does not distinguish the layers in this material, the asbestos is typically found in the paper backing of the vinyl flooring. This vinyl is applied over newer fiberboard underlayment and is located on the first floor in Rooms 101, 102, 107, 111, 112 and 113. This white vinyl



coves the entire second floor. Black floor tiles in Rooms 101 and 102 contain asbestos. These tiles are the lowest layer below several layers of flooring including carper, white vinyl, fiberboard and green vinyl. Black mastic associated with white 12" X 12" upper layer floor tiles under carpet in Rooms 105 and 106 contains asbestos. This mastic is applied over a layer of fiberboard underlayment. Remnants of old black mastic on the original tongue and groove wood subflooring contains asbestos. The extent of this mastic could not be accurately determined. The quantity estimate given is assuming that it exists throughout the building on wooden subflooring. - (Refer to Tables 1, 2 and 3 for specific information and Figure 1 for sample locations).

### **Surfacing**

Surfacing material is friable material that is sprayed on, troweled on, or otherwise applied to surfaces for decorative or other purposes.

No surfacing materials were located in Building A-3734.

**TABLE 1**  
**SUSPECT ACM SAMPLES**  
**Ft. BRAGG, BUILDING A-3734**

<b>FIELD ID</b>	<b>DESCRIPTION</b>	<b>LOCATION</b>	<b>ASBESTOS TYPE &amp; %</b>
3734-M-1	Drywall joint compound	Room 110 perimeter wall	No Asbestos Detected
<b>3734-1-2</b>	<b>White sheet vinyl flooring</b>	<b>Room 101, upper layer under carpet</b>	<b>25% chrysotile</b>
3734-1-3	Green sheet vinyl flooring	Room 101, under sample 2 and a layer of fiberboard underlayment	No Asbestos Detected
<b>3734-1-4</b>	<b>Black floor tile &amp; mastic</b>	<b>Room 101, under sample 3</b>	<b>Tile 15% chrysotile, mastic NAD</b>
3734-1-5	12" X 12" brown floor tile & mastic	Room 104	No Asbestos Detected
3734-1-6	Caulking material	Stairwell, on base molding	No Asbestos Detected
<b>3734-1-7</b>	<b>12" X 12" white floor tile &amp; mastic</b>	<b>Room 106, upper layer under carpet</b>	<b>Mastic 3% chrysotile, tile NAD</b>
3734-1-8	Green sheet vinyl flooring	Room 106, below sample 7 and a layer of fiberboard underlayment	No Asbestos Detected
<b>3734-1-9</b>	<b>White sheet vinyl flooring</b>	<b>Room 112, upper layer under carpet</b>	<b>25% chrysotile</b>
3734-1-10	Green sheet vinyl flooring	Room 112, under sample 9 and a layer of fiberboard underlayment	No Asbestos Detected
3734-1-11	Felt paper	Room 112, under samples 9 and 10. Between two layers of original tongue and groove wood sub-flooring	No Asbestos Detected
3734-1-12	2' X 2' typical ceiling tile	Room 101	No Asbestos Detected
3734-1-13	Gypsum board & joint compound	Room 101 perimeter wall	No Asbestos Detected
3734-1-14	2' X 2' patch ceiling tile	Room 102	No Asbestos Detected
3734-1-15	Drywall joint compound	Room 105, partition wall	No Asbestos Detected
3734-1-16	2' X 2' patch ceiling tile	Room 108	No Asbestos Detected
3734-1-17	Drywall joint compound	Room 108 at shower wall	No Asbestos Detected
3734-1-18	Caulking material	Room 111 around window frame	No Asbestos Detected
3734-1-19	Drywall joint compound	Room 111 perimeter wall	No Asbestos Detected
3734-S-20	12" X 12" tan floor tile & mastic	Stairwell mid landing	No Asbestos Detected
3734-1-21	Caulking material	Room 108 around urinal	No Asbestos Detected

<b>3734-1-22</b>	<b>Black mastic</b>	<b>Room 103, on original tongue and groove wood subflooring</b>	<b>5% chrysotile</b>
<b>3734-2-23</b>	<b>White sheet vinyl flooring</b>	<b>Room 201 under carpet</b>	<b>25% chrysotile</b>
3734-2-24	Green sheet vinyl flooring	Room 201 under sample 23 and a layer of fiberboard underlayment	No Asbestos Detected
3734-2-25	12" X 12" brown floor tile & mastic	Room 207 upper layer	No Asbestos Detected
3734-2-26	Drywall joint compound	Room 201 perimeter wall	No Asbestos Detected
3734-2-27	Fiberboard	Attic above Room 201, old ceiling applied to roof rafters	No Asbestos Detected
3734-2-28	Fiberboard	Room 208, old ceiling applied to roof rafters	No Asbestos Detected
3734-2-29	Drywall joint compound	Room 209 perimeter wall	No Asbestos Detected
3734-R-30	Roof shingle	Lower roof	No Asbestos Detected
3734-R-31	Roofing felt	Lower roof, under shingles	No Asbestos Detected
3734-R-32	Gray caulking material	Lower roof, on top of nail heads on flashing shingles	No Asbestos Detected
3734-R-33	Roof shingle	Lower roof	No Asbestos Detected
3734-R-34	Roofing felt	Lower roof, under shingles	No Asbestos Detected
3734-R-35	Caulking material	Lower roof, on top of nail heads on flashing shingles	No Asbestos Detected
3734-E-36	Caulking material	Exterior, second floor where stair rail penetrates metal siding	No Asbestos Detected
3734-E-37	Caulking material	Exterior around window frame at metal siding	No Asbestos Detected
3734-E-38	Caulking material	Exterior around window frame at metal siding	No Asbestos Detected

Samples testing positive for asbestos indicated in **BOLD** type

NAD = No Asbestos Detected

**TABLE 2**  
**ACM QUANTITY SUMMARY**  
**Ft. BRAGG, BUILDING A-3734**

Homogeneous Area Descriptions	Units	Functional Space Descriptions								
		First Floor	Second Floor							Totals
White sheet vinyl flooring	S.F.	2340	3700							6040
Black floor tiles	S.F.	1340								1340
Black mastic on white 12" X 12" floor tiles	S.F.	230								230
Black mastic remnants on wood sub-flooring	S.F.	2780	3700							6480

**S.F. = Square Foot, L.F. = Linear Foot, C.F. = Cubic Foot**

**TABLE 3**  
**MATERIAL CHARACTERIZATION AND ASSESSMENT**  
**Ft. BRAGG, BUILDING A-3734**

<b>MATERIAL</b>		<b>CHARACTERISTICS</b>			<b>ASSESSMENT</b>	
<b>Type</b>	<b>Description</b>	<b>Asbestos Yes/no/assumed</b>	<b>Quantity</b>	<b>Friable / Non- friable</b>	<b>Condition</b>	<b>Disturbance Potential</b>
Miscellaneous	White sheet vinyl flooring	Yes	6040 S.F.	Non-friable	Good	Low
Miscellaneous	Black floor tiles	Yes	1340 S.F.	Non-friable	Damaged	Low
Miscellaneous	Black mastic on white 12" X 12" floor tiles	Yes	230 S.F.	Non-friable	Good	Low
Miscellaneous	Black mastic remnants on wood sub-flooring	Yes	6480 S.F.	Non-friable	Good	Low

**S.F. = Square Foot, L.F. = Linear Foot, C.F. = Cubic Foot**

Figure 1

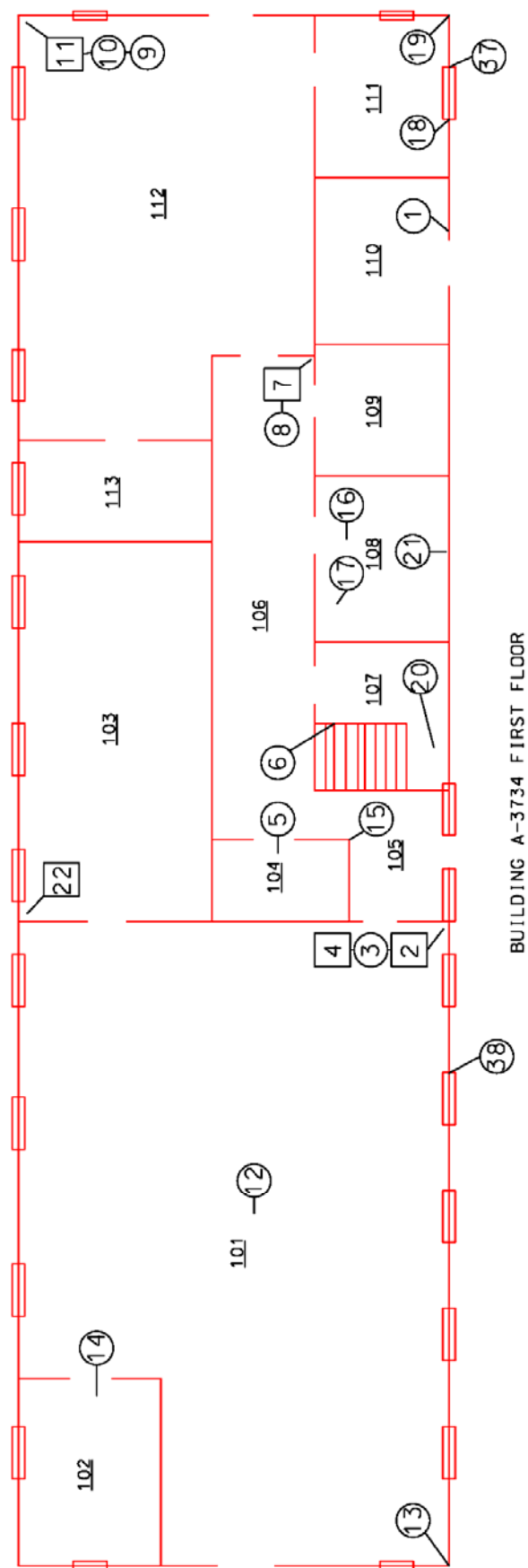
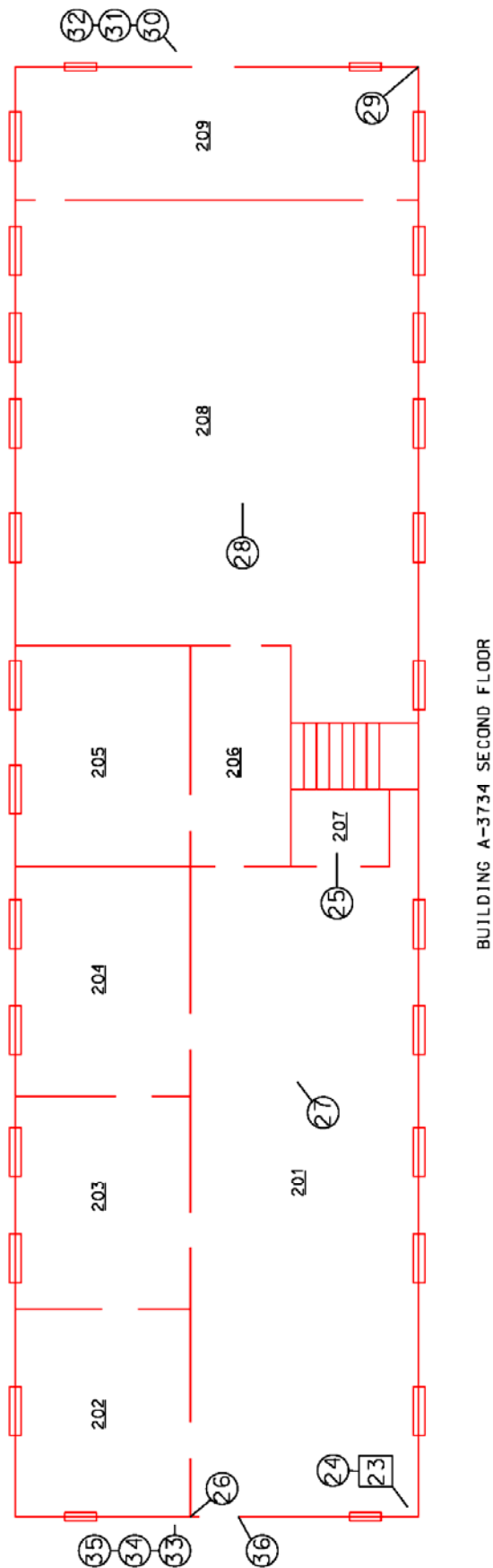


Figure 2



# **Appendix A**

## **Analytical Report – Carolina Environmental, Inc.**



CAROLINA ENVIRONMENTAL, INC.  
107 New Edition Court, Cary, NC 27511  
Phone: (919) 481-1413 Fax: (919) 481-1442

## LABORATORY REPORT ASBESTOS BULK ANALYSIS

Client: **US Army Corps of Engineers - Savannah**  
**District - EMU9**  
200 North Cobb Parkway, Bldg. 400 Ste. 404  
Marietta, GA 30062

CEI Lab Code: A10-0681  
Received: 02-01-10  
Analyzed: 02-03-10  
Reported: 02-03-10  
Analyst: Gary A. Swanson

Project: Ft Bragg Building A-3734; 10178

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3734-M-1	A990873	<u>JOINT COMPOUND</u> Homogeneous, White, Non-fibrous, Bound SILI 15 % CACO 85 %	ND
3734-1-2	A990874	<u>SHEET VINYL FLOORING</u> Heterogeneous, Beige, Grey, Fibrous, Bound CHRY 25% VINYL 50 % CELL 5 % BIND 15 % MAST 5 %	CHRY 25%
3734-1-3	A990875	<u>SHEET VINYL FLOORING</u> Heterogeneous, Blue, Brown, Fibrous, Bound VINYL 50 % CELL 40 % BIND 5 % MAST 5 %	ND
3734-1-4	A990876A	<u>FLOOR TILE</u> Homogeneous, Black, Fibrous, Tightly Bound CHRY 15% CACO 15 % VINYL 70 %	CHRY 15%
	A990876B	<u>MASTIC/FELT</u> Heterogeneous, Black, Fibrous, Tightly Bound TAR 25 % CELL 70 % SYNT 5 %	ND
3734-1-5	A990877A	<u>FLOOR TILE</u> Homogeneous, Tan, Non-fibrous, Tightly Bound CACO 15 % VINYL 85 %	ND

CAROLINA ENVIRONMENTAL, INC.  
107 New Edition Court, Cary, NC 27511  
Phone: 919-481-1413 Fax: 919-481-1442

Project: Ft Bragg Building A-3734; 10178

Lab Code: A10-0681

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION						% ASBESTOS
	A990877B	<u>MASTIC</u>						ND
	Homogeneous,	Black, Fibrous, Bound						
		MAST	90 %	CELL	10 %			
3734-1-6	A990878	<u>CAULKING</u>						ND
	Homogeneous,	Brown, Non-fibrous, Bound						
		CACO	20 %					
		BIND	80 %					
3734-1-7	A990879A	<u>FLOOR TILE</u>						ND
	Homogeneous,	Tan, Non-fibrous, Tightly Bound						
		CACO	15 %					
		VINYL	85 %					
	A990879B	<u>MASTIC</u>						CHRY 3 %
	Homogeneous,	Black, Fibrous, Bound						
		CHRY 3% MAST	90 %	CELL	7 %			
3734-1-8	A990880	<u>SHEET VINYL FLOORING</u>						ND
	Heterogeneous,	Blue, Brown, Fibrous, Bound						
		VINYL	50 %	CELL	40 %			
		TAR	7 %					
		MAST	3 %					
3734-1-9	A990881	<u>SHEET VINYL FLOORING</u>						CHRY 25 %
	Heterogeneous,	Beige, Grey, Fibrous, Bound						
		CHRY 25% VINYL	50 %	CELL	5 %			
		BIND	15 %					
		MAST	5 %					
3734-1-10	A990882	<u>SHEET VINYL FLOORING</u>						ND
	Heterogeneous,	Blue, Brown, Fibrous, Bound						
		VINYL	50 %	CELL	40 %			
		TAR	7 %					
		MAST	3 %					

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Lab Code: A10-0681

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS			
3734-1-11	A990883	<u>FELT PAPER</u> Heterogeneous, Black, Fibrous, Bound	ND			
		TAR 25 %	CELL SYNT	70 % 5 %		
3734-1-12	A990884	<u>CEILING TILE</u> Heterogeneous, White, Grey, Fibrous, Loosely Bound	ND			
		PAINT 5 %	CELL	35 %		
		PERL 25 %	FBGL	35 %		
3734-1-13	A990885	<u>GYPSUM BOARD/JOINT COMPOUND</u> Heterogeneous, Brown, Grey, Fibrous, Bound	ND			
		SILI 10 %	CELL	20 %		
		GYPSUM 37 %	FBGY	30 %		
		PAINT 3 %				
3734-1-14	A990886	<u>CEILING TILE</u> Heterogeneous, White, Grey, Fibrous, Loosely Bound	ND			
		PAINT 5 %	CELL	35 %		
		PERL 25 %	FBGL	35 %		
3734-1-15	A990887	<u>JOINT COMPOUND</u> Heterogeneous, White, Non-fibrous, Bound	ND			
		PAINT 10 %				
		SILI 15 %				
		CACO 75 %				
3734-1-16	A990888	<u>CEILING TILE</u> Heterogeneous, White, Grey, Fibrous, Loosely Bound	ND			
		PAINT 5 %	CELL	35 %		
		PERL 25 %	FBGL	35 %		
3734-1-17	A990889	<u>JOINT COMPOUND</u> Heterogeneous, White, Non-fibrous, Bound	ND			
		PAINT 10 %				
		SILI 15 %				
		CACO 75 %				

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Project: Ft Bragg Building A-3734; 10178

Lab Code: A10-0681

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS			
3734-1-18	A990890	<u>CAULKING</u> Homogeneous, Brown, White, Non-fibrous, Bound	ND			
		PAINT 10 %				
		CACO 20 %				
		BIND 70 %				
3734-1-19	A990891	<u>JOINT COMPOUND</u> Heterogeneous, White, Non-fibrous, Bound	ND			
		PAINT 10 %				
		SILI 15 %				
		CACO 75 %				
3734-S-20	A990892A	<u>FLOOR TILE</u> Homogeneous, Beige, Non-fibrous, Tightly Bound	ND			
		CACO 15 %				
		VINYL 85 %				
	A990892B	<u>MASTIC</u> Homogeneous, Yellow, Fibrous, Bound	ND			
		MAST 97 %	CELL	3 %		
3734-1-21	A990893	<u>CAULKING</u> Homogeneous, White, Fibrous, Bound	ND			
		SILI 10 %	TALC	2 %		
		BIND 88 %				
3734-1-22	A990894	<u>MASTIC</u> Homogeneous, Black, Fibrous, Bound	CHRY 5%			
		CHRY 5%	MAST 90 %	CELL 5 %		
3734-2-23	A990895	<u>SHEET VINYL FLOORING</u> Heterogeneous, Beige, Fibrous, Bound	CHRY 25%			
		CHRY 25%	VINYL 50 %	CELL 5 %		
		BIND 15 %				
		MAST 5 %				

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3734-2-24	A990896	<u>SHEET VINYL FLOORING</u> Heterogeneous, Blue, Brown, Fibrous, Bound VINYL 50 % CELL 40 % BIND 5 % MAST 5 %	ND
3734-2-25	A990897A	<u>FLOOR TILE</u> Homogeneous, Beige, Non-fibrous, Tightly Bound CACO 15 % VINYL 85 %	ND
3734-2-26	A990898	<u>JOINT COMPOUND</u> Heterogeneous, White, Non-fibrous, Bound PAINT 10 % SILI 15 % CACO 75 %	ND
3734-2-27	A990899	<u>FIBERBOARD</u> Heterogeneous, Brown, Green, Fibrous, Loosely Bound PAINT 5 % CELL 95 %	ND
3734-2-28	A990900	<u>FIBERBOARD</u> Heterogeneous, Brown, White, Fibrous, Loosely Bound PAINT 5 % CELL 95 %	ND
3734-2-29	A990901	<u>JOINT COMPOUND</u> Heterogeneous, White, Non-fibrous, Bound PAINT 10 % SILI 15 % CACO 75 %	ND
3734-R-30	A990902	<u>ROOF SHINGLE</u> Heterogeneous, Black, White, Fibrous, Bound GRAV 20 % FBGL 20 % TAR 50 % SILI 10 %	ND

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Lab Code: A10-0681

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3734-R-31	A990903	<u>ROOFING FELT</u> Homogeneous, Black, Fibrous, Bound TAR 20 % CELL 80 %	ND
3734-R-32	A990904	<u>CAULKING</u> Homogeneous, Grey, Fibrous, Bound CACO 20 % CELL 5 % BIND 75 %	ND
3734-R-33	A990905	<u>ROOF SHINGLE</u> Heterogeneous, Black, White, Fibrous, Bound GRAV 20 % FBGL 20 % TAR 50 % SILI 10 %	ND
3734-R-34	A990906	<u>ROOFING FELT</u> Homogeneous, Black, Fibrous, Bound TAR 20 % CELL 80 %	ND
3734-R-35	A990907	<u>CAULKING</u> Homogeneous, Grey, Fibrous, Bound CACO 20 % CELL 5 % BIND 75 %	ND
3734-E-36	A990908	<u>CAULKING</u> Homogeneous, White, Non-fibrous, Bound PAINT 5 % CACO 20 % BIND 75 %	ND
3734-E-37	A990909	<u>CAULKING</u> Homogeneous, White, Non-fibrous, Bound CACO 20 % BIND 80 %	ND

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Lab Code: A10-0681

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3734-E-38	A990910	<u>CAULKING</u>	ND
	Homogeneous.	White, Non-fibrous, Bound	
		CACO 20 %	
		BIND 80 %	

**The following definitions apply to the abbreviations used in the ASBESTOS BULK ANALYSIS REPORT:**

CHRY = Chrysotile	CELL = Cellulose	DEBR = Debris
AMOS = Amosite	FBGL = Fibrous Glass	BIND = Binder
CROC = Crocidolite	CACO = Calcium Carbonate	SILI = Silicates
TREM = Tremolite	SYNT = Synthetics	GRAV = Gravel
ANTH = Anthophyllite	WOLL = Wollastonite	MAST = Mastic
ACTN = Actinolite	CERWL = Ceramic Wool	PLAS = Plaster
N D = None Detected	NTREM = Non-Asbestiform Tremolite	PERL = Perlite
NANTH = Non-Asbestiform Anthophyllite	FBGY = Fibrous Gypsum	RUBR = Rubber
		VER = Vermiculite

**CLIENT:** US Army Corps of Engineers - Savannah District - EMU9

**PROJECT:** Ft Bragg Building A-3734; 10178

**CEI LAB CODE:** A10-0681

Stereoscopic microscopy and polarized light microscopy coupled with dispersion staining is the analytical technique used for sample identification. The percentage of each component is visually estimated by volume. These results pertain only to the samples analyzed. The samples were analyzed as submitted by the client and may not be representative of the larger material in question. Unless notified in writing to return samples, Carolina Environmental, Inc. will discard all bulk samples after 30 days.

Many vinyl floor tiles have been manufactured using greater than 1% asbestos. Often the asbestos was milled to a fiber size below the detection limit of polarized light microscopy. Therefore, a "None Detected" (ND) reading on vinyl floor tile does not necessarily exclude the presence of asbestos. Transmission electron microscopy provides a more conclusive form of analysis for vinyl floor tiles.

is certified by the signature below that Carolina Environmental, Inc. is accredited by the National Voluntary Accreditation Program (NVLAP) for the analysis of asbestos in bulk materials. The accredited test method is EPA / 600 / M4-82 / 020 for the analysis of asbestos in building materials. Procedures described in EPA / 600 / R-93 / 116 have been incorporated here applicable. The detection limit for the method is 0.1% (trace amount). Carolina Environmental, Inc.'s NVLAP accreditation number is #101768-0. This report is not to be used to claim product endorsement by NVLAP or any agency of the U. S. Government. This report and its contents are only valid when reproduced in full. Dust and soil analyses for asbestos using PLM are not covered under NVLAP accreditation.

**ANALYST**



**REVIEWED BY**



Tianbao Bai, Ph.D.  
Laboratory Director

**End of Report**



# **Appendix B**

## **Sample Chain of Custody Forms**

A10.0681 (38)  
A990873. A990910

**ASBESTOS CHAIN OF CUSTODY - US ARMY CORPS OF ENGINEERS**

Project: <b>Ft Bragg Building A-3734</b>	Job No.: <b>10178</b>
Sampler: <b>Tim Jones</b>	Analysis: <b>PLM</b>

DATE	FIELD ID	EMU ID	COMPONENTS/NOTES
1/25/2010	3734-M-1	62498	Drywall joint compound
1/25/2010	3734-1-2	62499	Sheet vinyl flooring
1/25/2010	3734-1-3	62500	Sheet vinyl flooring
1/25/2010	3734-1-4	62501	Floor tile & mastic
1/25/2010	3734-1-5	62502	Floor tile & mastic
1/25/2010	3734-1-6	62503	Caulking material
1/25/2010	3734-1-7	62504	Floor tile & mastic
1/25/2010	3734-1-8	62505	Sheet vinyl flooring
1/25/2010	3734-1-9	62506	Sheet vinyl flooring
1/25/2010	3734-1-10	62507	Sheet vinyl flooring
1/25/2010	3734-1-11	62508	Felt paper
1/25/2010	3734-1-12	62509	Ceiling tile
1/25/2010	3734-1-13	62510	Gypsum board & joint compound
1/25/2010	3734-1-14	62511	Ceiling tile
1/25/2010	3734-1-15	62512	Drywall joint compound
1/25/2010	3734-1-16	62513	Ceiling tile
1/25/2010	3734-1-17	62514	Drywall joint compound
1/25/2010	3734-1-18	62515	Caulking material
1/25/2010	3734-1-19	62516	Drywall joint compound
1/25/2010	3734-S-20	62517	Floor tile & mastic
1/25/2010	3734-1-21	62518	Caulking material
1/25/2010	3734-1-22	62519	Black mastic

Relinquished By	Date	Time	Received By	Date	Time
<i>Tim Jones</i>	<i>1-29-10</i>	<i>1400</i>	<i>Kurt Rott</i>	<i>020810</i>	<i>3:00 PM</i>

--

A 10.0681

**ASBESTOS CHAIN OF CUSTODY - US ARMY CORPS OF ENGINEERS**

<b>Project:</b>	<b>Ft Bragg Building A-3734</b>	<b>Job No.:</b>	<b>10178</b>
<b>Sampler:</b>	<b>Tim Jones</b>	<b>Analysis:</b>	<b>PLM</b>

DATE	FIELD ID	EMU ID	COMPONENTS/NOTES
1/25/2010	3734-2-23	62520	Sheet vinyl flooring
1/25/2010	3734-2-24	62521	Sheet vinyl flooring
1/25/2010	3734-2-25	62522	Floor tile & mastic
1/25/2010	3734-2-26	62523	Drywall joint compound
1/25/2010	3734-2-27	62524	Fiberboard
1/25/2010	3734-2-28	62525	Fiberboard
1/25/2010	3734-2-29	62526	Drywall joint compound
1/25/2010	3734-R-30	62527	Roof shingle
1/25/2010	3734-R-31	62528	Roofing felt
1/25/2010	3734-R-32	62529	Caulking material
1/25/2010	3734-R-33	62530	Roof shingle
1/25/2010	3734-R-34	62531	Roofing felt
1/25/2010	3734-R-35	62532	Caulking material
1/25/2010	3734-E-36	62533	Caulking material
1/25/2010	3734-E-37	62534	Caulking material
1/25/2010	3734-E-38	62535	Caulking material

Relinquished By	Date	Time	Received By	Date	Time
<i>Tim Jones</i>	1-29-10	1400			

--

# **Appendix C**

## **Certifications & Accreditations**



North Carolina Department of Health and Human Services  
Division of Public Health · Epidemiology Section  
Occupational and Environmental Epidemiology Branch  
1912 Mail Service Center · Raleigh, North Carolina 27699-1912  
Tel 919-707-5950 · Fax 919-870-4808

Beverly Eaves Perdue, Governor  
Lanier M. Cansler, Secretary

Jeffrey P. Engel, M.D.  
State Health Director

October 26, 2009

Timothy A Jones  
4411 Smoke Stone Court  
Marietta, GA 30062

Dear Mr. Jones:

Based upon the review of your accreditation application, the Health Hazards Control Unit (HHCU) has determined that you have fulfilled the requirements and are eligible for asbestos accreditation as a(n) INSPECTOR. Your assigned North Carolina accreditation number is 12210, which is reflected on your enclosed North Carolina Accreditation card. Please be sure to take this card with you to any asbestos work site where you are employed. The State requires that all persons conducting asbestos abatement or asbestos management activities be accredited and have their identification card on site.

Your North Carolina Inspector accreditation will expire on SEPTEMBER 30, 2010. It is NOT the policy of the HHCU to issue renewal notices. If you wish to continue working as a(n) Inspector after this expiration date, you must successfully complete the required training and submit a completed application to this office prior to September 30, 2010. If you should continue to perform asbestos management activities as a(n) Inspector without a valid North Carolina accreditation, you will be in violation of State regulations and may be cited for noncompliance.

Sincerely,

A handwritten signature in black ink, appearing to read "Marita E Cheek".

Marita E Cheek  
Accreditation/Certification Secretary  
Health Hazards Control Unit

Enclosure

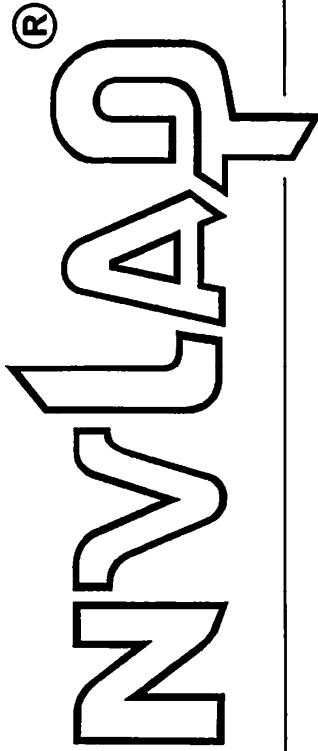


North Carolina Public Health  
Working for a healthier and safer North Carolina  
Everywhere. Everyday. Everybody.

Location: 5505 Six Forks Road, 2nd Floor, Room D-1 · Raleigh, N.C. 27609



United States Department of Commerce  
National Institute of Standards and Technology



# Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 101768-0

**Carolina Environmental, Inc.**  
Cary, NC

is accredited by the National Voluntary Laboratory Accreditation Program for specific services,  
listed on the Scope of Accreditation, for:

## BULK ASBESTOS FIBER ANALYSIS

*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.  
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality  
management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).*

2009-04-01 through 2010-03-31

Effective dates



*Dolly J. Bruce*  
For the National Institute of Standards and Technology

NVLAP-01C (REV. 2009-01-28)



**US Army Corps  
of Engineers®**

# **Savannah District Environmental and Materials Unit**

## ***Hazardous Building Materials Survey***

# **Building No. A-3734 Fort Bragg, North Carolina**

**Prepared by Timothy A. Jones**



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The findings of this report are not to be construed as an official Department of the Army position, unless so designated by other authorized documents.



**Hazardous Building Materials Survey**

**January 2010**

# **Building No. A-3734 Fort Bragg, North Carolina**

by Timothy A. Jones

Final Report

**Prepared for**

**U.S. Army Corps of Engineers  
Savannah District**

# Hazardous Building Materials Survey Report

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## Introduction

### Background

Building A-3734 is a 7700 square foot two story wood frame structure with a wood frame floor system covered with vinyl flooring and carpet. The roof system is asphalt shingles over wood decking. Interior ceilings are newer metal framed with suspended tiles. Interior walls are wood framed covered with gypsum drywall. Exterior walls are wood siding covered with newer metal siding. Windows are newer metal replacements. The building was reportedly built in 1941 though major renovations appear to have taken place relatively recently.

## Description of study

### Investigation

This report documents the hazardous building materials survey of Building No. A-3734 at Fort Bragg, North Carolina conducted on 25 January 2010 by USACE Savannah District employees Tim Jones and Jason Hart and includes only building materials located at the time of inspection. This survey was conducted in general accordance with the Statement of Services for Hazardous Building Material Inspections developed by Ray Willingham, retired, USACE Savannah District. The investigation includes a visual identification and location of such items as: fluorescent and mercury-vapor lights; battery back-up exit lights and emergency lights; mercury-containing thermostats and switches; refrigerant containing air conditioners, water fountains and ice makers; above and below ground storage tanks; transformers; built in chemical type fire suppression systems; smoke detectors; and lead building materials excluding lead based paint. Other hazardous building materials not listed above may also be included at the discretion of the inspectors. Asbestos is excluded from this inspection as it is covered separately in an asbestos inspection report.

## Conclusions

The following information gathered during the survey of Building A-3734 is presented in attached information:

- a. Light Count:* The fluorescent and mercury vapor light count results are presented in Table 1.
- b. Lead Building Materials:* Inspection of the building revealed lead in the cast iron plumbing drainage and vent piping system used as pipe joints. Details are outlined in Table 2.
- c. Fire Extinguishers:* Six portable fire extinguishers were located in the building.
- d. Mercury Thermostat:* Three mercury thermostats were located in the building.
- e. Compressed Refrigerant Gas:* Four small central air conditioners were located in the building. Two refrigerated drinking fountains, five refrigerators and two ice machines were located in the building. These units are assumed to contain refrigerant gas that should be recovered prior to demolition.
- f. Chemicals:* Approximately five gallons of various cleaning chemicals were located in the building.

# Tables

**TABLE 1**  
**FORT BRAGG BUILDING A-3734**  
**FLUORESCENT AND MERCURY LIGHT FIXTURES**

<b>AREA IDENTIFICATION</b>	<b># &amp; TYPE LIGHTS PRESENT</b>	<b>DESCRIPTION OF LIGHTS</b>
Interior	106	2 Bulb, 4 Foot Fluorescent Fixtures
Interior	5	Battery backup exit lights

**TABLE 2**  
**FORT BRAGG BUILDING A-3734**  
**LEAD BUILDING COMPONENTS**

<b>BUILDING COMPONENT</b>	<b>DESCRIPTION</b>	<b>LOCATION</b>	<b>ESTIMATED NUMBER</b>
Hot poured lead pipe joint	In plumbing drainage, waste and vent piping	Under building and in plumbing chase walls	75-100



**US Army Corps  
of Engineers®**

# **Savannah District Environmental and Materials Unit**

## **Building A-3736 Ft. Bragg, North Carolina**

**Prepared by Timothy A. Jones**



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The findings of this report are not to be construed as an official Department of the Army position, unless so designated by other authorized documents.

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**Asbestos Survey**

**January 2010**

# **Building A-3736 Fort Bragg, NC**

Prepared by Timothy A. Jones

Final report

**Prepared for    US Army Corps of Engineers  
Savannah District**



# Asbestos Inspection Report

---

## Introduction

### Scope of the Investigation

This report documents the asbestos inspection and survey of Building A-3736 at Fort Bragg, North Carolina conducted on 25 January 2010 by Savannah District US Army Corps of Engineers employee Tim Jones. The survey was conducted in general accordance with the regulatory guidelines in the Asbestos Hazard Emergency Response Act (AHERA) (40 CFR Part 763 Subpart E Sections 763.80-763.88) and “Guidance for Controlling Asbestos-Containing Materials in Buildings” (Purple Book) (EPA publication number 560/5-85-024). Although not required by the AHERA guidelines, roof and other exterior miscellaneous materials were also inspected and sampled.

### Background

Building A-3736 is a 7700 square foot two story wood frame structure with a wood frame floor system covered with vinyl flooring and carpet. The roof system is asphalt shingles over wood decking. Interior ceilings are newer metal framed with suspended tiles. Interior walls are wood framed covered with gypsum drywall. Exterior walls are wood siding covered with newer metal siding. Windows are newer metal replacements. The building was reportedly built in 1941 though major renovations appear to have taken place relatively recently.

## Description of study

### Investigation

All accessible areas of Building A-3736 were visually inspected for suspected asbestos containing materials (ACM) by a North Carolina accredited inspector. A copy of the inspector’s accreditation certificate is included in Appendix C. Bulk samples of suspect ACM’s were collected. This report details ACM as identified at the time of inspection only.

The bulk samples were analyzed by Carolina Environmental, Inc. The laboratory is accredited by the National Voluntary Laboratory Accredited Program (NVLAP Accreditation sponsored by the National Institute of Standards and Technology (NIST)). A copy of their accreditation certificates is included in Appendix C. The samples were

analyzed by the accepted method of polarized light microscopy (PLM) using EPA's Method EPA/M4-82-020. The laboratory's analytical report is included in Appendix A.

In compliance with the AHERA regulations, material is considered an Asbestos Containing Material (ACM) when it contains greater than one percent asbestos. Likewise, in this report, any material containing concentrations greater than one percent asbestos will be considered "positive". In some instances, materials containing one percent asbestos, or less, may be assumed to be an asbestos containing material at the discretion of the inspector. A narrative discussion of the AHERA ACM types (i.e., thermal systems insulation, miscellaneous and surfacing materials) found in Building A-3736 is included in this report where relevant. Bulk sample information appears on Table 1. Estimated quantities of individual asbestos containing materials appear on Table 2. Material characterization of asbestos containing materials appears on Table 3. The approximate location where each bulk sample was obtained is shown on the building floor plans, which appear as Figures. Positive ACM samples are highlighted on the floor plan Figures with their numbers enclosed in squares; samples with negative analytical results for asbestos are indicated with their numbers enclosed in circles. Most homogeneous areas are highlighted on the Figures. It is reasonable to assume that all materials similar to those testing positive, also contain positive amounts of asbestos and should be treated as such.

## Conclusions

### Thermal Systems Insulation (TSI)

TSI is insulation material applied to pipes, fittings, tanks, ducts, or for other interior structural components to prevent heat loss or gain, or water condensation, or for other purposes.

No asbestos containing TSI was located in Building A-3736.

### Miscellaneous Materials

Miscellaneous materials include building material on structural components, structural members or fixtures, such as floor and ceiling tiles, and do not include surfacing or TSI. In the past, there were a great number of miscellaneous building materials that had asbestos fibers added to them during the manufacturing process to increase durability and fireproofing qualities. The following suspect miscellaneous materials at Building No. A-3736 were found to contain or are assumed to contain asbestos:

*Flooring Materials:* White sheet vinyl flooring, typically located under carpet, contains asbestos. Though the laboratory report does not distinguish the layers in this material, the asbestos is typically found in the paper backing of the vinyl flooring. This vinyl is typically applied over newer fiberboard underlayment and is located on the first floor in Rooms 101, 102, 103, 104, 105, 107, 109, 113, 114 and 115. On the

second floor the white vinyl is located in Rooms 203, 204, 208 and 209. Black floor tiles located below the white vinyl in Rooms 203, 204, 208 and 209 contain asbestos. Black mastic associated with white 12" X 12" upper layer floor tiles in Rooms 109, 113, 206 and 2076 contains asbestos. - (Refer to Tables 1, 2 and 3 for specific information and Figure 1 for sample locations).

### **Surfacing**

Surfacing material is friable material that is sprayed on, troweled on, or otherwise applied to surfaces for decorative or other purposes.

No surfacing materials were located in Building A-3736.

**TABLE 1**  
**SUSPECT ACM SAMPLES**  
**Ft. BRAGG, BUILDING A-3736**

<b>FIELD ID</b>	<b>DESCRIPTION</b>	<b>LOCATION</b>	<b>ASBESTOS TYPE &amp; %</b>
3736-1-1	Ceiling tile	Room 101, typical tile	No Asbestos Detected
3736-1-2	Fiberboard	Room 101, old ceiling above newer suspended ceiling, remnants only	No Asbestos Detected
3736-1-3	Gypsum board & joint compound	Room 101 wall	No Asbestos Detected
<b>3736-1-4</b>	<b>White sheet vinyl flooring</b>	<b>Room 101, upper layer under carpet</b>	<b>25% chrysotile</b>
3736-1-5	Green sheet vinyl flooring	Room 101, under sample 4 and a layer of plywood underlayment	No Asbestos Detected
3736-1-6	Black mastic?	Room 101, under sample 5, on original tongue and groove wood sub-flooring	No Asbestos Detected
3736-1-7	Ceiling tile	Room 102, patch tile	No Asbestos Detected
<b>3736-1-8</b>	<b>White sheet vinyl flooring</b>	<b>Room 102, upper layer under carpet</b>	<b>25% chrysotile</b>
3736-1-9	Green sheet vinyl flooring	Room 102, under sample 4 and a layer of plywood underlayment	No Asbestos Detected
3736-1-10	Floor leveling compound	Room 102, at edge of room under carpet	No Asbestos Detected
3736-1-11	Drywall joint compound	Room 104, above suspended ceiling, filling electrical junction box	<1% chrysotile, verified by point count
3736-1-12	Drywall joint compound	Room 104 partition wall	No Asbestos Detected
3736-1-13	Gypsum board & joint compound	Room 105 perimeter wall	No Asbestos Detected
3736-1-14	Drywall joint compound	Room 111 partition wall	No Asbestos Detected
3736-1-15	Green sheet vinyl flooring	Room 117 under carpet	No Asbestos Detected
3736-1-16	Drywall joint compound	Room 117 perimeter wall	No Asbestos Detected
<b>3736-1-17</b>	<b>12" X 12" white floor tile &amp; mastic</b>	<b>Room 113, under carpet</b>	<b>Mastic 5% chrysotile, tile NAD</b>
<b>3736-1-18</b>	<b>12" X 12" white floor tile &amp; mastic</b>	<b>Room 109</b>	<b>Mastic 5% chrysotile, tile NAD</b>
<b>3736-1-19</b>	<b>White sheet vinyl flooring</b>	<b>Room 113 under carpet</b>	<b>25% chrysotile</b>
<b>3736-1-20</b>	<b>White sheet vinyl flooring</b>	<b>Room 105 under carpet</b>	<b>25% chrysotile</b>
3736-1-21	Floor leveling compound	Room 105 at edge of room under carpet	No Asbestos Detected

<b>3736-1-22</b>	<b>Sheet vinyl flooring? Floor tile?</b>	<b>Room 114 under carpet and plywood</b>	<b>Tile 3% chrysotile, mastic NAD</b>
3736-1-23	Green sheet vinyl flooring	Room 114, under sample 22 and a layer of fiberboard underlayment	No Asbestos Detected
<b>3736-1-24</b>	<b>White sheet vinyl flooring</b>	<b>Room 104 under carpet</b>	<b>25% chrysotile</b>
3736-S-25	White floor tile & mastic	Stairwell mid landing under carpet	No Asbestos Detected
3736-2-26	Ceiling tile	Room 205, older tile	No Asbestos Detected
3736-2-27	Drywall joint compound	Room 205 partition wall	No Asbestos Detected
3736-2-28	Drywall joint compound	Attic above Room 202, section of older ceiling above newer suspended ceiling	<1% chrysotile, verified by point count
3736-2-29	Drywall joint compound	Attic above Room 209, section of older ceiling above newer suspended ceiling	<1% chrysotile, verified by point count
3736-2-30	Drywall joint compound	Room 209 perimeter wall	No Asbestos Detected
<b>3736-2-31</b>	<b>12" X 12" white floor tile &amp; mastic</b>	<b>Room 206</b>	<b>Mastic 5% chrysotile, tile NAD</b>
3736-2-32	Green sheet vinyl flooring	Room 206, below sample 31	No Asbestos Detected
3736-2-33	Patch ceiling tile	Room 204	No Asbestos Detected
3736-2-34	Caulking material	Room 209 around window frame at drywall	No Asbestos Detected
3736-2-35	Caulking material	Room 202 around window frame at drywall	No Asbestos Detected
3736-2-36	Caulking material	Room 205 around door frame at drywall	No Asbestos Detected
<b>3736-2-37</b>	<b>Black floor tile &amp; mastic</b>	<b>Room 209, lower layer under sample 40 and a layer of fiberboard underlayment</b>	<b>Tile 15% chrysotile, mastic NAD</b>
3736-2-38	Felt paper	Room 209, under sample 37	No Asbestos Detected
3736-2-39	Floor leveling compound	Room 209, around edge of room under carpet	No Asbestos Detected
<b>3736-2-40</b>	<b>White sheet vinyl flooring</b>	<b>Room 209, upper layer under carpet</b>	<b>25% chrysotile</b>
<b>3736-2-41</b>	<b>White sheet vinyl flooring</b>	<b>Room 208, upper layer under carpet</b>	<b>25% chrysotile</b>
<b>3736-2-42</b>	<b>Black floor tile &amp; mastic</b>	<b>Room 208, under sample 41 and a layer of fiberboard underlayment</b>	<b>Tile 15% chrysotile, mastic NAD</b>
3736-2-43	Felt paper	Room 208, under sample 42	No Asbestos Detected
3736-2-44	Black mastic? Paint? Dirt?	Room 201, under all flooring finishes, on original tongue and groove wood subflooring	No Asbestos Detected
3736-2-45	Green sheet vinyl flooring	Room 202 under carpet	No Asbestos Detected

3736-2-46	Black mastic? Paint? Dirt?	Room 202, under all flooring finishes, on original tongue and groove wood subflooring	No Asbestos Detected
3736-R-47	Roof shingle	Lower roof	No Asbestos Detected
3736-R-48	Roofing felt	Lower roof, under shingles	No Asbestos Detected
3736-R-49	Caulking material	Lower roof, applied to top of nail heads at flashing shingles	No Asbestos Detected
3736-R-50	Roof shingle	Lower roof	No Asbestos Detected
3736-R-51	Roofing felt	Lower roof, under shingles	No Asbestos Detected
3736-R-52	Caulking material	Lower roof, applied to top of nail heads at flashing shingles	No Asbestos Detected
3736-1-53	Felt paper	Room 111, under ceramic tile floor over wood subfloor	No Asbestos Detected
3736-M-54	Drywall joint compound	Room 116 wall	No Asbestos Detected
3736-C-55	White mastic	Crawlspace, over fiberglass pipe insulation	No Asbestos Detected

Samples testing positive for asbestos indicated in **BOLD** type

NAD = No Asbestos Detected

**TABLE 2**  
**ACM QUANTITY SUMMARY**  
**Ft. BRAGG, BUILDING A-3736**

Homogeneous Area Descriptions	Units	Functional Space Descriptions								
		First Floor	Second Floor							Totals
White sheet vinyl flooring	S.F.	2640	2025							4665
Black floor tiles	S.F.		2025							2025
Black mastic on 12" X 12" floor tiles	S.F.	250	60							310

**S.F. = Square Foot, L.F. = Linear Foot, C.F. = Cubic Foot**

**TABLE 3**  
**MATERIAL CHARACTERIZATION AND ASSESSMENT**  
**Ft. BRAGG, BUILDING A-3736**

<b>MATERIAL</b>		<b>CHARACTERISTICS</b>			<b>ASSESSMENT</b>	
<b>Type</b>	<b>Description</b>	<b>Asbestos Yes/no/assumed</b>	<b>Quantity</b>	<b>Friable / Non- friable</b>	<b>Condition</b>	<b>Disturbance Potential</b>
Miscellaneous	White sheet vinyl flooring	Yes	4665 S.F.	Non-friable	Good	Low
Miscellaneous	Black floor tiles	Yes	2025 S.F.	Non-friable	Unknown	Low
Miscellaneous	Black mastic on 12" X 12" floor tiles	Yes	310 S.F.	Non-friable	Good	Low

**S.F. = Square Foot, L.F. = Linear Foot, C.F. = Cubic Foot**



Figure 1

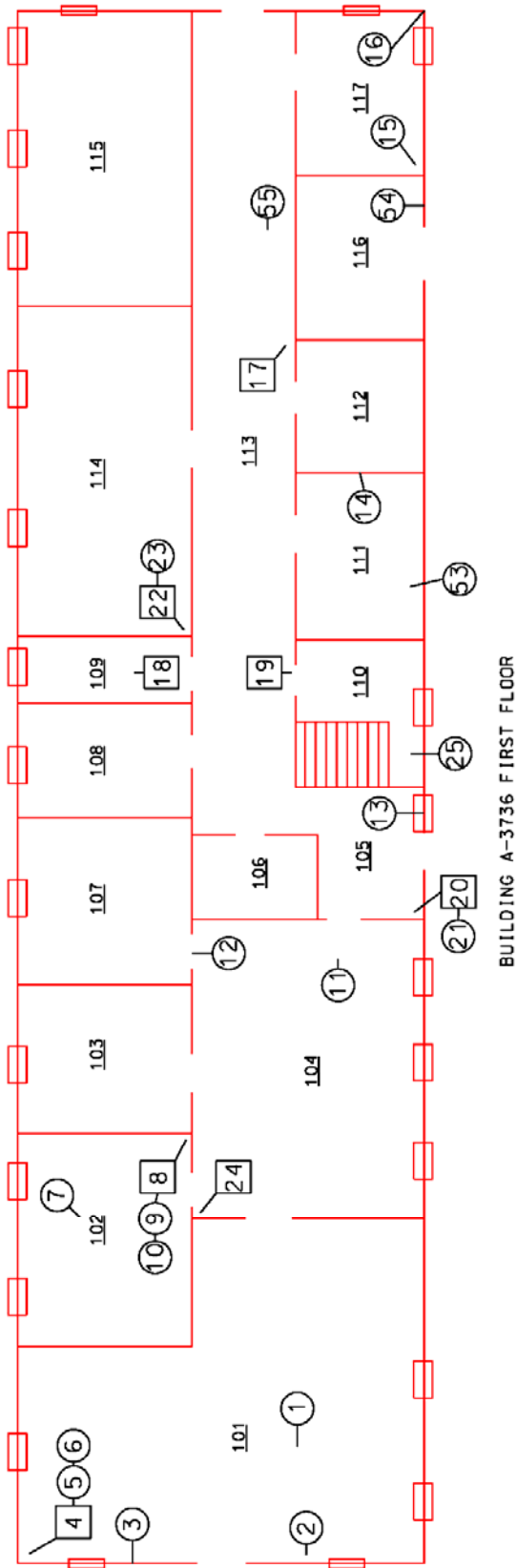
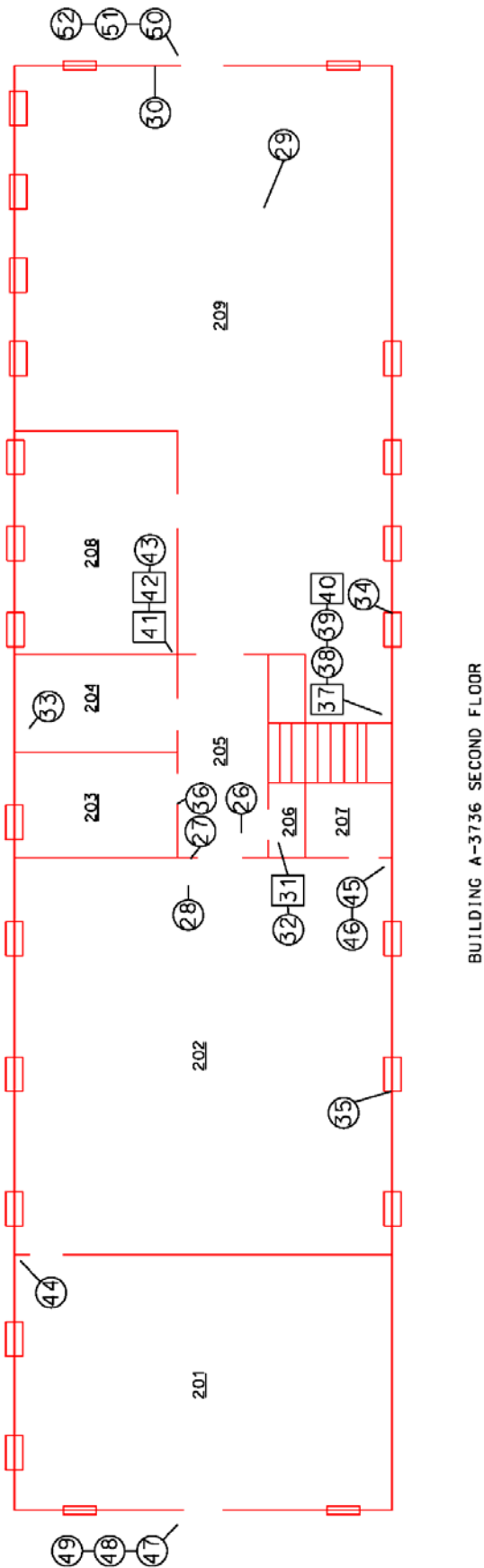


Figure 2



BUILDING A-3736 SECOND FLOOR

# **Appendix A**

## **Analytical Report – Carolina Environmental, Inc.**

CAROLINA ENVIRONMENTAL, INC.  
107 New Edition Court, Cary, NC 27511  
Phone: (919) 481-1413 Fax: (919) 481-1442

## LABORATORY REPORT ASBESTOS BULK ANALYSIS

Client: **US Army Corps of Engineers - Savannah**  
**District - EMU9**  
200 North Cobb Parkway, Bldg. 400 Ste. 404  
Marietta, GA 30062

CEI Lab Code: A10-0688  
Received: 02-01-10  
Analyzed: 02-02-10  
Reported: 02-02-10  
Analyst: Gary A. Swanson

Project: Ft Bragg Building A-3736; 10178

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3736-1-1	A991029	<u>CEILING TILE</u> Heterogeneous, White, Grey, Fibrous, Loosely Bound	ND
		PAINT 5 % CELL 35 % PERL 25 % FBGL 35 %	
3736-1-2	A991030	<u>FIBERBOARD</u> Heterogeneous, Brown, White, Fibrous, Loosely Bound	ND
		PAINT 5 % CELL 95 %	
3736-1-3	A991031	<u>GYPSUM BOARD/JOINT COMPOUND</u> Heterogeneous, Brown, White, Fibrous, Bound	ND
		SILI 10 % CELL 20 % GYPSUM 40 % FBGY 30 %	
3736-1-4	A991032	<u>SHEET VINYL FLOORING</u> Heterogeneous, Tan, Grey, Fibrous, Bound	CHRY 25 %
		CHRY 25 % VINYL 50 % CELL 5 % BIND 15 % MAST 5 %	
3736-1-5	A991033	<u>SHEET VINYL FLOORING</u> Heterogeneous, Blue, Brown, Fibrous, Bound	ND
		VINYL 50 % CELL 40 % TAR 7 % MAST 3 %	
3736-1-6	A991034	<u>MASTIC</u> Heterogeneous, Black, Fibrous, Bound	ND
		MAST 90 % CELL 10 %	

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Lab Code: A10-0688

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3736-1-7	A991035	<u>CEILING TILE</u> Heterogeneous, White, Grey, Fibrous, Loosely Bound PAINT 5 % CELL 35 % PERL 25 % FBGL 35 %	ND
3736-1-8	A991036	<u>SHEET VINYL FLOORING</u> Heterogeneous, Tan, Grey, Fibrous, Bound CHRY 25% VINYL 50 % CELL 5 % BIND 15 % MAST 5 %	CHRY 25%
3736-1-9	A991037	<u>SHEET VINYL FLOORING</u> Heterogeneous, Blue, Brown, Fibrous, Bound VINYL 50 % CELL 40 % TAR 7 % MAST 3 %	ND
3736-1-10	A991038	<u>LEVELING COMPOUND</u> Homogeneous, White, Fibrous, Bound MAST 2 % CELL 2 % SILI 10 % BIND 86 %	ND
3736-1-11	A991039	<u>JOINT COMPOUND</u> Homogeneous, Off-white, Non-fibrous, Bound CHRY <1% SILI 15 % CACO 85 %	CHRY <1%
3736-1-12	A991040	<u>JOINT COMPOUND</u> Homogeneous, Off-white, Non-fibrous, Bound SILI 15 % CACO 85 %	ND
3736-1-13	A991041	<u>GYPSUM BOARD/JOINT COMPOUND</u> Heterogeneous, Brown, White, Fibrous, Bound SILI 10 % CELL 20 % BIND 40 % FBGY 30 %	ND

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3736-1-14	A991042	<u>JOINT COMPOUND</u> Heterogeneous, White, Non-fibrous, Bound PAINT 10 % SILI 15 % CACO 75 %	ND
3736-1-15	A991043	<u>SHEET VINYL FLOORING</u> Heterogeneous, Blue, Brown, Fibrous, Bound VINYL 50 % CELL 40 % TAR 7 % MAST 3 %	ND
3736-1-16	A991044	<u>JOINT COMPOUND</u> Heterogeneous, White, Non-fibrous, Bound PAINT 10 % SILI 15 % CACO 75 %	ND
3736-1-17	A991045A	<u>FLOOR TILE</u> Homogeneous, White, Non-fibrous, Tightly Bound CACO 15 % VINYL 85 %	ND
	A991045B	<u>MASTIC</u> Homogeneous, Black, Fibrous, Bound CHRY 5% MAST 95 %	CHRY 5%
3736-1-18	A991046A	<u>FLOOR TILE</u> Homogeneous, White, Non-fibrous, Tightly Bound CACO 15 % VINYL 85 %	ND
	A991046B	<u>MASTIC</u> Homogeneous, Black, Fibrous, Bound CHRY 5% MAST 95 %	CHRY 5%

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS	
3736-1-19	A991047	<u>SHEET VINYL FLOORING</u> Grey, Fibrous, Bound	CHRY	25%
	Heterogeneous,	CHRY 25% VINYL 50 % CELL 5 % BIND 15 % MAST 5 %		
3736-1-20	A991048	<u>SHEET VINYL FLOORING</u> Beige, Fibrous, Bound	CHRY	25%
	Heterogeneous,	CHRY 25% VINYL 50 % CELL 5 % BIND 15 % MAST 5 %		
3736-1-21	A991049	<u>LEVELING COMPOUND</u> White, Fibrous, Bound	ND	
	Heterogeneous,	SILI 15 % CELL 5 % BIND 77 % MAST 3 %		
3736-1-22	A991050A	<u>FLOORING (TILE)</u> White, Fibrous, Tightly Bound	CHRY	3%
	Homogeneous,	CHRY 3% CACO 15 % VINYL 82 %		
	A991050B	<u>MASTIC</u> Yellow, Fibrous, Bound	ND	
	Homogeneous,	MAST 95 % CELL 5 %		
3736-1-23	A991051	<u>SHEET VINYL FLOORING</u> Blue, Brown, Fibrous, Bound	ND	
	Heterogeneous,	VINYL 50 % CELL 40 % TAR 7 % MAST 3 %		
3736-1-24	A991052	<u>SHEET VINYL FLOORING</u> Grey, Fibrous, Bound	CHRY	25%
	Heterogeneous,	CHRY 25% VINYL 50 % CELL 5 % BIND 15 % MAST 5 %		

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Lab Code: A10-0688

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3736-S-25	A991053A	<u>FLOOR TILE</u> Homogeneous, White, Non-fibrous, Tightly Bound CACO 15 % VINYL 85 %	ND
	A991053B	<u>MASTIC</u> Homogeneous, Brown, Fibrous, Bound MAST 90 % CELL 10 %	ND
3736-2-26	A991054	<u>CEILING TILE</u> Heterogeneous, White, Grey, Fibrous, Loosely Bound PERL 25 % CELL 35 % PAINT 5 % FBGL 35 %	ND
3736-2-27	A991055	<u>JOINT COMPOUND</u> Heterogeneous, White, Non-fibrous, Bound PAINT 20 % SILI 15 % CACO 65 %	ND
3736-2-28	A991056	<u>JOINT COMPOUND</u> Heterogeneous, Off-white, Fibrous, Bound CHRY <1% PAINT 10 % SILI 15 % CACO 75 %	CHRY <1%
3736-2-29	A991057	<u>JOINT COMPOUND</u> Heterogeneous, Off-white, Fibrous, Bound CHRY <1% PAINT 10 % SILI 15 % CACO 75 %	CHRY <1%
3736-2-30	A991058	<u>JOINT COMPOUND</u> Heterogeneous, White, Non-fibrous, Bound PAINT 10 % SILI 15 % CACO 75 %	ND



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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3736-2-31	A991059A	<u>FLOOR TILE</u> Homogeneous, Grey, Non-fibrous, Tightly Bound CACO 15 % VINYL 85 %	ND
	A991059B	<u>MASTIC</u> Homogeneous, Black, Fibrous, Bound CHRY 5% MAST 95 %	CHRY 5%
3736-2-32	A991060	<u>SHEET VINYL FLOORING</u> Heterogeneous, Blue, Brown, Fibrous, Bound VINYL 65 % CELL 30 % MAST 5 %	ND
3736-2-33	A991061	<u>CEILING TILE</u> Heterogeneous, White, Grey, Fibrous, Loosely Bound PERL 25 % CELL 35 % PAINT 5 % FBGL 35 %	ND
3736-2-34	A991062	<u>CAULKING</u> Homogeneous, Brown, Non-fibrous, Bound CACO 20 % BIND 80 %	ND
3736-2-35	A991063	<u>CAULKING</u> Homogeneous, Brown, Non-fibrous, Bound CACO 20 % BIND 80 %	ND
3736-2-36	A991064	<u>CAULKING</u> Homogeneous, White, Non-fibrous, Bound CACO 20 % BIND 80 %	ND

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CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS	
3736-2-37	A991065A	<u>FLOOR TILE</u> Homogeneous, Black, Fibrous, Bound	CHRY	15%
		CHRY 15% CACO 15% VINYL 70%		
	A991065B	<u>MASTIC</u> Homogeneous, Black, Fibrous, Bound	ND	
		MAST 90% CELL 10% SYNT <1%		
3736-2-38	A991066	<u>FELT PAPER</u> Heterogeneous, Black, Fibrous, Bound	ND	
		TAR 22% CELL 70% MAST 3% SYNT 5%		
3736-2-39	A991067	<u>LEVELING COMPOUND</u> Homogeneous, White, Non-fibrous, Bound	ND	
		SILI 20% CELL 5% BIND 75%		
3736-2-40	A991068	<u>SHEET VINYL FLOORING</u> Heterogeneous, Grey, Fibrous, Bound	CHRY	25%
		CHRY 25% VINYL 50% CELL 5% BIND 15% MAST 5%		
3736-2-41	A991069	<u>SHEET VINYL FLOORING</u> Heterogeneous, Grey, Fibrous, Bound	CHRY	25%
		CHRY 25% VINYL 50% CELL 5% BIND 15% MAST 5%		
3736-2-42	A991070A	<u>FLOOR TILE</u> Homogeneous, Black, Fibrous, Tightly Bound	CHRY	15%
		CHRY 15% CACO 15% VINYL 70%		

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Lab Code: A10-0688

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS			
	A991070B	<u>MASTIC</u> Homogeneous, Black, Fibrous, Bound	ND			
		MAST 95 % CELL 5 %				
3736-2-43	A991071	<u>FELT PAPER</u> Heterogeneous, Black, Fibrous, Bound	ND			
		TAR 20 % CELL 70 % MAST 5 % SYNT 5 %				
3736-2-44	A991072	<u>MASTIC</u> Heterogeneous, Black, Brown, Fibrous, Bound	ND			
		MAST 90 % CELL 10 % SYNT <1 %				
3736-2-45	A991073	<u>SHEET VINYL FLOORING</u> Heterogeneous, Blue, Brown, Fibrous, Bound	ND			
		VINYL 50 % CELL 40 % BIND 7 % MAST 3 %				
3736-2-46	A991074	<u>MASTIC</u> Heterogeneous, Black, Brown, Fibrous, Bound	ND			
		MAST 90 % CELL 10 %				
3736-R-47	A991075	<u>ROOF SHINGLE</u> Heterogeneous, Black, White, Fibrous, Bound	ND			
		GRAV 20 % FBGL 20 % TAR 50 % SILI 10 %				
3736-R-48	A991076	<u>ROOFING FELT</u> Homogeneous, Black, Fibrous, Bound	ND			
		TAR 20 % CELL 80 %				

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Lab Code: A10-0688

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
3736-R-49	A991077	<u>CAULKING</u> Homogeneous, Grey, Fibrous, Bound CACO 20 % CELL 5 % BIND 75 %	ND
3736-R-50	A991078	<u>ROOF SHINGLE</u> Heterogeneous, Black, White, Fibrous, Bound GRAV 20 % FBGL 20 % TAR 50 % SILI 10 %	ND
3736-R-51	A991079	<u>ROOFING FELT</u> Homogeneous, Black, Fibrous, Bound TAR 20 % CELL 80 %	ND
3736-R-52	A991080	<u>CAULKING</u> Homogeneous, Grey, Fibrous, Bound CACO 20 % CELL 5 % BIND 75 %	ND
3736-1-53	A991081	<u>FELT PAPER</u> Homogeneous, Black, Fibrous, Bound TAR 15 % CELL 85 %	ND
3736-M-54	A991082	<u>JOINT COMPOUND</u> Homogeneous, White, Non-fibrous, Bound SILI 15 % CACO 85 %	ND
3736-C-55	A991083	<u>MASTIC</u> Heterogeneous, White, Fibrous, Bound CACO 10 % FBGL 5 % BIND 75 % WOLL 10 %	ND

**The following definitions apply to the abbreviations used in the ASBESTOS BULK ANALYSIS REPORT:**

CHRY = Chrysotile	CELL = Cellulose	DEBR = Debris
AMOS = Amosite	FBGL = Fibrous Glass	BIND = Binder
CROC = Crocidolite	CACO = Calcium Carbonate	SILI = Silicates
TREM = Tremolite	SYNT = Synthetics	GRAV = Gravel
ANTH = Anthophyllite	WOLL = Wollastonite	MAST = Mastic
ACTN = Actinolite	CERWL = Ceramic Wool	PLAS = Plaster
N D = None Detected	NTREM = Non-Asbestiform Tremolite	PERL = Perlite
NANTH = Non-Asbestiform Anthophyllite	FBGY = Fibrous Gypsum	RUBR = Rubber
		VER = Vermiculite

---

CLIENT: US Army Corps of Engineers - Savannah District - EMU9

PROJECT: Ft Bragg Building A-3736; 10178

CEI LAB CODE: A10-0688

Stereoscopic microscopy and polarized light microscopy coupled with dispersion staining is the analytical technique used for sample identification. The percentage of each component is visually estimated by volume. These results pertain only to the samples analyzed. The samples were analyzed as submitted by the client and may not be representative of the larger material in question. Unless notified in writing to return samples, Carolina Environmental, Inc. will discard all bulk samples after 30 days.

Many vinyl floor tiles have been manufactured using greater than 1% asbestos. Often the asbestos was milled to a fiber size below the detection limit of polarized light microscopy. Therefore, a "None Detected" (ND) reading on vinyl floor tile does not necessarily exclude the presence of asbestos. Transmission electron microscopy provides a more conclusive form of analysis for vinyl floor tiles.

It is certified by the signature below that Carolina Environmental, Inc. is accredited by the National Voluntary Accreditation Program (NVLAP) for the analysis of asbestos in bulk materials. The accredited test method is EPA / 600 / M4-82 / 020 for the analysis of asbestos in building materials. Procedures described in EPA / 600 / R-93 / 116 have been incorporated where applicable. The detection limit for the method is 0.1% (trace amount). Carolina Environmental, Inc.'s NVLAP accreditation number is #101768-0. This report is not to be used to claim product endorsement by NVLAP or any agency of the U. S. Government. This report and its contents are only valid when reproduced in full. Dust and soil analyses for asbestos using PLM are not covered under NVLAP accreditation.

ANALYST



REVIEWED BY



Tianbao Bai, Ph.D.  
Laboratory Director

**End of Report**

# **Appendix B**

## **Sample Chain of Custody Forms**

A10.0688 (55)  
A 991029. A 991082

**ASBESTOS CHAIN OF CUSTODY - US ARMY CORPS OF ENGINEERS**

Project: <b>Ft Bragg Building A-3736</b>	Job No.: <b>10178</b>
Sampler: <b>Tim Jones</b>	Analysis: <b>PLM</b>

DATE	FIELD ID	EMU ID	COMPONENTS/NOTES
1/25/2010	3736-1-1	62536	Ceiling tile
1/25/2010	3736-1-2	62537	Fiberboard
1/25/2010	3736-1-3	62538	Gypsum board & joint compound
1/25/2010	3736-1-4	62539	Sheet vinyl flooring
1/25/2010	3736-1-5	62540	Sheet vinyl flooring
1/25/2010	3736-1-6	62541	Black mastic?
1/25/2010	3736-1-7	62542	Ceiling tile
1/25/2010	3736-1-8	62543	Sheet vinyl flooring
1/25/2010	3736-1-9	62544	Sheet vinyl flooring
1/25/2010	3736-1-10	62545	Floor leveling compound
1/25/2010	3736-1-11	62546	Drywall joint compound
1/25/2010	3736-1-12	62547	Drywall joint compound
1/25/2010	3736-1-13	62548	Gypsum board & joint compound
1/25/2010	3736-1-14	62549	Drywall joint compound
1/25/2010	3736-1-15	62550	Sheet vinyl flooring
1/25/2010	3736-1-16	62551	Drywall joint compound
1/25/2010	3736-1-17	62552	Floor tile & mastic
1/25/2010	3736-1-18	62553	Floor tile & mastic
1/25/2010	3736-1-19	62554	Sheet vinyl flooring
1/25/2010	3736-1-20	62555	Sheet vinyl flooring
1/25/2010	3736-1-21	62556	Floor leveling compound
1/25/2010	3736-1-22	62557	Sheet vinyl flooring

Relinquished By	Date	Time	Received By	Date	Time
<i>Tim Jones</i>	<i>1-29-10</i>	<i>1400</i>	<i>Kate Rod</i>	<i>02/01/10</i>	<i>2:20 PM</i>

--

A10.0688

**ASBESTOS CHAIN OF CUSTODY - US ARMY CORPS OF ENGINEERS**

Project: <b>Ft Bragg Building A-3736</b>	Job No.: <b>10178</b>
Sampler: <b>Tim Jones</b>	Analysis: <b>PLM</b>

DATE	FIELD ID	EMU ID	COMPONENTS/NOTES
1/25/2010	3736-1-23	62558	Sheet vinyl flooring
1/25/2010	3736-1-24	62559	Sheet vinyl flooring
1/25/2010	3736-S-25	62560	Floor tile & mastic
1/25/2010	3736-2-26	62561	Ceiling tile
1/25/2010	3736-2-27	62562	Drywall joint compound
1/25/2010	3736-2-28	62563	Drywall joint compound
1/25/2010	3736-2-29	62564	Drywall joint compound
1/25/2010	3736-2-30	62565	Drywall joint compound
1/25/2010	3736-2-31	62566	Floor tile & mastic
1/25/2010	3736-2-32	62567	Sheet vinyl flooring
1/25/2010	3736-2-33	62568	Ceiling tile
1/25/2010	3736-2-34	62569	Caulking material
1/25/2010	3736-2-35	62570	Caulking material
1/25/2010	3736-2-36	62571	Caulking material
1/25/2010	3736-2-37	62572	Floor tile & mastic
1/25/2010	3736-2-38	62573	Felt paper
1/25/2010	3736-2-39	62574	Floor leveling compound
1/25/2010	3736-2-40	62575	Sheet vinyl flooring
1/25/2010	3736-2-41	62576	Sheet vinyl flooring
1/25/2010	3736-2-42	62577	Floor tile & mastic
1/25/2010	3736-2-43	62578	Felt paper
1/25/2010	3736-2-44	62579	Black mastic?

Relinquished By	Date	Time	Received By	Date	Time
<i>Tim Jones</i>	1-29-10	1400			

--



## ASBESTOS CHAIN OF CUSTODY - US ARMY CORPS OF ENGINEERS

Project:	<b>Ft Bragg Building A-3736</b>	Job No.:	<b>10178</b>
Sampler:	Tim Jones	Analysis:	PLM

[illegible]

Relinquished By	Date	Time	Received By	Date	Time
Tim Jones	1-29-10	1400			

--

# **Appendix C**

## **Certifications & Accreditations**



North Carolina Department of Health and Human Services  
Division of Public Health · Epidemiology Section  
Occupational and Environmental Epidemiology Branch  
1912 Mail Service Center · Raleigh, North Carolina 27699-1912  
Tel 919-707-5950 · Fax 919-870-4808

Beverly Eaves Perdue, Governor  
Lanier M. Cansler, Secretary

Jeffrey P. Engel, M.D.  
State Health Director

October 26, 2009

Timothy A Jones  
4411 Smoke Stone Court  
Marietta, GA 30062

Dear Mr. Jones:

Based upon the review of your accreditation application, the Health Hazards Control Unit (HHCU) has determined that you have fulfilled the requirements and are eligible for asbestos accreditation as a(n) INSPECTOR. Your assigned North Carolina accreditation number is 12210, which is reflected on your enclosed North Carolina Accreditation card. Please be sure to take this card with you to any asbestos work site where you are employed. The State requires that all persons conducting asbestos abatement or asbestos management activities be accredited and have their identification card on site.

Your North Carolina Inspector accreditation will expire on SEPTEMBER 30, 2010. It is NOT the policy of the HHCU to issue renewal notices. If you wish to continue working as a(n) Inspector after this expiration date, you must successfully complete the required training and submit a completed application to this office prior to September 30, 2010. If you should continue to perform asbestos management activities as a(n) Inspector without a valid North Carolina accreditation, you will be in violation of State regulations and may be cited for noncompliance.

Sincerely,

A handwritten signature in black ink, appearing to read "Marita E Cheek".

Marita E Cheek  
Accreditation/Certification Secretary  
Health Hazards Control Unit

Enclosure

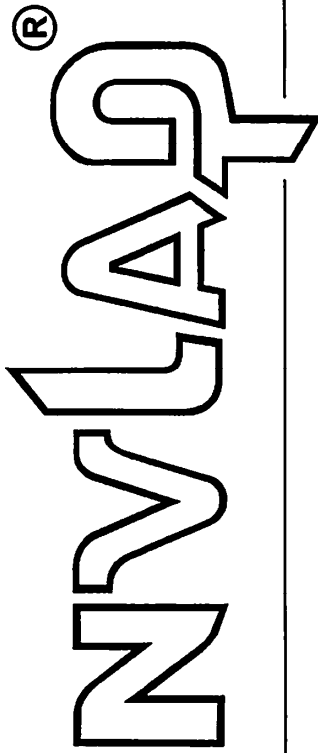


North Carolina Public Health  
Working for a healthier and safer North Carolina  
Everywhere. Everyday. Everybody.

Location: 5505 Six Forks Road, 2nd Floor, Room D-1 · Raleigh, N.C. 27609



United States Department of Commerce  
National Institute of Standards and Technology



## Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 101768-0

**Carolina Environmental, Inc.**  
Cary, NC

is accredited by the National Voluntary Laboratory Accreditation Program for specific services,  
listed on the Scope of Accreditation, for:

### BULK ASBESTOS FIBER ANALYSIS

*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.  
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality  
management system (refer to joint ISO-ILAC-IAF Communiqué dated January 2009).*

2009-04-01 through 2010-03-31

Effective dates



*Dolly J. Bruce*  
For the National Institute of Standards and Technology

NVLAP-01C (REV. 2009-01-28)



**US Army Corps  
of Engineers®**

**Savannah District  
Environmental and Materials Unit**

*Hazardous Building Materials Survey*

**Building No. A-3736  
Fort Bragg, North Carolina**

Prepared by Timothy A. Jones



The contents of this report are not to be used for advertising, publication, or promotional purposes. Citation of trade names does not constitute an official endorsement or approval of the use of such commercial products.

The findings of this report are not to be construed as an official Department of the Army position, unless so designated by other authorized documents.

**Hazardous Building Materials Survey**

**January 2010**

# **Building No. A-3736 Fort Bragg, North Carolina**

by Timothy A. Jones

Final Report

**Prepared for**

**U.S. Army Corps of Engineers  
Savannah District**

# Hazardous Building Materials Survey Report

---

## Introduction

### Background

Building A-3736 is a 7700 square foot two story wood frame structure with a wood frame floor system covered with vinyl flooring and carpet. The roof system is asphalt shingles over wood decking. Interior ceilings are newer metal framed with suspended tiles. Interior walls are wood framed covered with gypsum drywall. Exterior walls are wood siding covered with newer metal siding. Windows are newer metal replacements. The building was reportedly built in 1941 though major renovations appear to have taken place relatively recently.

## Description of study

### Investigation

This report documents the hazardous building materials survey of Building No. A-3736 at Fort Bragg, North Carolina conducted on 25 January 2010 by USACE Savannah District employees Tim Jones and Jason Hart and includes only building materials located at the time of inspection. This survey was conducted in general accordance with the Statement of Services for Hazardous Building Material Inspections developed by Ray Willingham, retired, USACE Savannah District. The investigation includes a visual identification and location of such items as: fluorescent and mercury-vapor lights; battery back-up exit lights and emergency lights; mercury-containing thermostats and switches; refrigerant containing air conditioners, water fountains and ice makers; above and below ground storage tanks; transformers; built in chemical type fire suppression systems; smoke detectors; and lead building materials excluding lead based paint. Other hazardous building materials not listed above may also be included at the discretion of the inspectors. Asbestos is excluded from this inspection as it is covered separately in an asbestos inspection report.



## Conclusions

The following information gathered during the survey of Building A-3736 is presented in attached information:

- a. Light Count:* The fluorescent and mercury vapor light count results are presented in Table 1.
- b. Lead Building Materials:* Inspection of the building revealed lead in the cast iron plumbing drainage and vent piping system used as pipe joints. Details are outlined in Table 2.
- c. Fire Extinguishers:* Five portable fire extinguishers were located in the building.
- d. Mercury Thermostat:* One mercury thermostat was located in the building.
- e. Compressed Refrigerant Gas:* Four small central air conditioners and three window air conditioners were located in the building. Two refrigerated drinking fountains, two refrigerators and one de-humidifier were located in the building. These units are assumed to contain refrigerant gas that should be recovered prior to demolition.

# Tables

**TABLE 1  
FORT BRAGG BUILDING A-3736  
FLUORESCENT AND MERCURY LIGHT FIXTURES**

<b>AREA IDENTIFICATION</b>	<b># &amp; TYPE LIGHTS PRESENT</b>	<b>DESCRIPTION OF LIGHTS</b>
Interior	100	2 Bulb, 4 Foot Fluorescent Fixtures
Interior	2	4 Bulb, 4 Foot Fluorescent Fixtures
Interior	1	Small screw in fluorescent bulb
Interior	5	Battery backup exit lights
Interior	2	Cases of 4 foot fluorescent bulbs

**TABLE 2  
FORT BRAGG BUILDING A-3736  
LEAD BUILDING COMPONENTS**

<b>BUILDING COMPONENT</b>	<b>DESCRIPTION</b>	<b>LOCATION</b>	<b>ESTIMATED NUMBER</b>
Hot poured lead pipe joint	In plumbing drainage, waste and vent piping	Under building and in plumbing chase walls	75-100



**US Army Corps  
of Engineers®**

# Savannah District Environmental and Materials Unit

## *Asbestos Survey*

# Building A-4638 Fort Bragg, North Carolina

Prepared by Timothy A. Jones



The contents of this report are not to be used for advertising, publication, or promotional purposes. Citation of trade names does not constitute an official endorsement or approval of the use of such commercial products.

The findings of this report are not to be construed as an official Department of the Army position, unless so designated by other authorized documents.

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**Asbestos Survey**

**January 2010**

# **Building A-4638 Fort Bragg, North Carolina**

Final report

**Prepared for: U.S. Army Corps of Engineers  
Savannah District**

# Asbestos Inspection Report

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## Introduction

### Scope of the Investigation

This report documents the asbestos inspection and survey of Building A-4638 at Ft. Bragg; North Carolina conducted on 26 January 2010 by Savannah District U.S. Army Corps of Engineers employee Tim Jones. The survey was conducted in general accordance with the regulatory guidelines in the Asbestos Hazard Emergency Response Act (AHERA) (40 CFR Part 763 Subpart E Sections 763.80-763.88) and “Guidance for Controlling Asbestos-Containing Materials in Buildings” (Purple Book) (EPA publication number 560/5-85-024). Although not required by the AHERA guidelines, roof and other exterior miscellaneous materials were also inspected and sampled.

### Background

Building A-4638 is an approximately 4,720 square foot two-story wood framed structure with a wooden flooring system and asphalt shingle roofing system. The building is currently as office space. Ceilings are drop ceilings with hung ceiling tiles on a metal grid. Original drywall ceilings exist above the drop ceiling, in some parts, the ceilings have been covered with stippled ceiling surfacing and perforated ceiling tiles in other areas. The floors are currently covered with carpet, over tile over original green battleship vinyl. The raised parts of the floor generally have plywood fixed over the original vinyl floor underneath the carpet. The exterior of the structure is aluminum siding over wood siding. The building was reportedly constructed in 1941.

## Description of study

### Investigation

All accessible areas of Building No. A-4638 were visually inspected for suspected asbestos containing materials (ACM) by a North Carolina accredited inspector. A copy of the inspector’s accreditation certificate is included in Appendix C. Bulk samples of all suspect ACM’s were collected. This report details ACM as identified at the time of inspection only.

Carolina Environmental, Inc analyzed the bulk samples. The laboratory is accredited by the National Voluntary Laboratory Accredited Program (NVLAP

Accreditation sponsored by the National Institute of Standards and Technology (NIST)). A copy of the laboratory's accreditation certificate is included in Appendix C. The samples were analyzed by the accepted method of polarized light microscopy (PLM) using EPA's "Method for the Determination of Asbestos in Bulk Building Materials", EPA/600/R-93/116. The laboratory's analytical report is included in Appendix A.

In compliance with the AHERA regulations, material is considered an Asbestos Containing Material (ACM) when it contains greater than one percent asbestos. Likewise, in this report, any material containing concentrations greater than one percent asbestos will be considered "positive". Occasionally, materials containing less than one percent asbestos, or not sampled, are assumed to be a "positive" asbestos containing material at the discretion of the inspectors. A narrative discussion of the AHERA ACM types (i.e., thermal systems insulation, miscellaneous and surfacing materials) found in Building No. A-4638 is included in this report where relevant. Bulk sample information appears on Table 1. Estimated quantities of individual asbestos containing materials appear on Table 2. Material characterization of asbestos containing materials appears on Table 3. The approximate location where each bulk sample was obtained is shown on the building floor plans, which appear as Figures 1 - 2. Positive ACM samples are indicated on the floor plan Figures with their numbers enclosed in squares and, where possible, locations of positive ACM are identified. Samples testing negative for asbestos are indicated on the floor plan Figures with their numbers enclosed in circles. It is reasonable to assume that all materials similar to those testing positive also contain positive amounts of asbestos and should be treated as such.

## Conclusions

### Thermal Systems Insulation (TSI)

TSI is insulation material applied to pipes, fittings, tanks, ducts, or on other interior structural components to prevent heat loss or gain, or water condensation, or for other purposes.

No asbestos containing TSI was located in Building A-4638.



## Miscellaneous Materials

Miscellaneous materials include building material on structural components, structural members or fixtures, such as floor and ceiling tiles, and do not include surfacing or TSI. In the past, there were a great number of miscellaneous building materials that had asbestos fibers added to them during the manufacturing process to increase durability and fireproofing qualities.

- a. *Fiberboard Adhesive:* The fiberboard located within the bathroom of the building has been fixed to the drywall wall using an adhesive. The adhesive used to fix the fiberboard contains asbestos. Approximately 425 sq. ft. of fiberboard was found within the building. - (Refer to Tables 1, 2 and 3 for specific information and Figure 1 for sample locations).
- b. *Cement Board:* The interior walls and ceiling of the mechanical room are made of cement board that is assumed to contain asbestos. It is estimated that there is approximately 800 sq. ft. of the cement board on the exterior of the building. The cement board is assumed to be in good condition and non-friable. - (Refer to Tables 2 and 3 for specific information).
- c. *Drywall Joint Compound:* The interior walls of both levels are covered with drywall. The ceilings of the lower level are also covered with drywall. The drywall joint compound used in the seams and over the nails contains asbestos. There is approximately 10,500 sq. ft. of this material found in the building. The drywall and joint compound within the building is in good condition, however, it is friable. - (Refer to Tables 1, 2 and 3 for specific information and Figure 1 and 2 for sample locations).
- d. *Floor Tile & Mastic:* The building has carpet over tile over green vinyl on top of the original wood subflooring. The floor tile and mastic was found to contain asbestos. Approximately 4,000 sq. ft. of floor tile was found within the building. Rooms 112 and 113 do not contain floor tile or mastic. The floor tiles and mastic are assumed to be in good condition and non-friable. - (Refer to Tables 1, 2 and 3 for specific information and Figure 1 and 2 for sample locations).
- e. *Duct Flex Joints:* There are two duct flex joints on the HVAC ducts located within the mechanical room. These are assumed to contain asbestos. Both are in good condition and non-friable. - (Refer to Tables 2 and 3 for specific information).

**Miscellaneous Materials (continued)**

- f. *Flashing Cement:* Approximately 1 sq. ft. of flashing cement was located on the roof of the building. The flashing cement is assumed to contain asbestos. The flashing cement is assumed to be in good condition and non-friable. - (Refer to Tables 2 and 3 for specific information).

**Surfacing**

Surfacing material is friable material that is sprayed on, troweled on, or otherwise applied to surfaces for decorative or other purposes.

*Stippled Ceiling Surfacing:* The first floor drywall ceiling has been coated with a stippled ceiling surfacing in some rooms. It is located above the tiled ceiling grid. The drywall joint compound has been found to contain asbestos throughout the entire building, including the ceiling. Positive samples were taken in room 110; similar material is located on the ceilings of rooms 101, 104, 108, 109 and is assumed to contain asbestos. There is approximately 660 sq ft. of this material. The material is delaminating from the ceiling in room 110, so it is considered significantly damaged and is friable. - (Refer to Tables 1, 2 and 3 for specific information and Figure 1 for sample locations).

**TABLE 1**  
**SUSPECT ACM SAMPLES**  
**FORT BRAGG, BUILDING A-4638**

<b>FIELD ID</b>	<b>DESCRIPTION</b>	<b>LOCATION</b>	<b>ASBESTOS TYPE &amp; %</b>
<b>4638-1-1</b>	<b>Floor tile &amp; mastic</b>	<b>Room 110, on floor, white floor tile and mastic under carpet</b>	<b>Tile 2% Chrysotile, Mastic NAD</b>
4638-1-2	Black mastic?	Room 110, on floor, on original wood subflooring	NAD
4638-1-3	Felt paper	Room 110, on floor in between original layers of subflooring	NAD
<b>4638-1-4</b>	<b>Floor tile &amp; mastic</b>	<b>Room 107, on floor, white floor tile and mastic under carpet</b>	<b>Tile 2% Chrysotile, Mastic NAD</b>
4638-1-5	Black mastic?	Room 107, on floor, on original wood subflooring	NAD
<b>4638-1-6</b>	<b>Drywall joint compound</b>	<b>Room 112, on ceiling</b>	<b>2% Chrysotile</b>
<b>4638-1-7</b>	<b>Drywall joint compound</b>	<b>Room 112, on wall</b>	<b>2% Chrysotile</b>
<b>4638-1-8</b>	<b>Fiberboard &amp; adhesive</b>	<b>Room 112, on wall over drywall</b>	<b>FB NAD, Adhesive 2% Chrysotile</b>
<b>4638-1-9</b>	<b>Gypsum board &amp; joint compound</b>	<b>Room 107, on wall</b>	<b>Gypsum Board NAD, Joint Compound 2% Chrysotile</b>
4638-1-10	Drywall joint compound	Room 107, on wall	NAD
<b>4638-1-11</b>	<b>Drywall joint compound</b>	<b>Room 107, on ceiling</b>	<b>2% Chrysotile</b>
4638-1-12	Ceiling tile	Room 110, on ceiling	NAD
<b>4638-1-13</b>	<b>Textured ceiling surfacing</b>	<b>Room 110, over drywall ceiling</b>	<b>3% Chrysotile</b>
4638-1-14	Ceiling tile	Room 110, over drywall ceiling	NAD
4638-1-15	Ceiling tile	Room 110, over drywall ceiling	NAD
<b>4638-1-16</b>	<b>Textured ceiling surfacing</b>	<b>Room 110, over drywall ceiling</b>	<b>3% Chrysotile</b>
<b>4638-1-17</b>	<b>Textured ceiling surfacing</b>	<b>Room 110, over drywall ceiling</b>	<b>3% Chrysotile</b>
<b>4638-1-18</b>	<b>Drywall joint compound</b>	<b>Room 110, on drywall ceiling under stippled ceiling surfacing</b>	<b>2% Chrysotile</b>

4638-1-19	Duct sealer	Room 107, on duct above drop ceiling	NAD
4638-1-20	Textured ceiling surfacing	Room 111, over drywall ceiling	NAD
4638-1-21	Textured ceiling surfacing	Room 103, on drywall ceiling	NAD
4638-1-22	Caulking material	Room 102, around door frame	NAD
<b>4638-2-23</b>	<b>Floor tile &amp; mastic</b>	<b>Room 201, on floor</b>	<b>Tile 2% Chrysotile, Mastic 5% Chrysotile</b>
4638-2-24	Sheet vinyl flooring	Room 201, on floor	NAD
4638-2-25	Felt paper	Room 201, on floor between layers of subflooring	NAD
<b>4638-2-26</b>	<b>Floor tile &amp; mastic</b>	<b>Room 206, on floor</b>	<b>Tile NAD, Mastic 5% Chrysotile</b>
4638-2-27	Sheet vinyl flooring	Room 206, on floor	NAD
4638-2-28	Caulking material	Room 206, above wainscoting on wall	NAD
<b>4638-2-29</b>	<b>Gypsum board &amp; joint compound</b>	<b>Room 209, on wall</b>	<b>Gypsum Board NAD, Joint Compound 2% Chrysotile</b>
4638-2-30	Fiberboard	Room 203, above drop ceiling nailed to rafters	NAD
<b>4638-2-31</b>	<b>Drywall joint compound</b>	<b>Room 203, on wall</b>	<b>Gypsum Board NAD, Joint Compound 2% Chrysotile</b>
4638-2-32	Ceiling tile	Room 206, on ceiling	NAD
4638-S-33	Fiberboard & adhesive	In stairwell, on lower portion of wall	NAD
4638-2-34	Fiberboard	Room 201, above drop ceiling nailed to rafters	NAD
4638-R-35	Roof shingle	On lower roof, over felt and wood decking	NAD
4638-R-36	Roofing felt	On lower roof, under asphalt shingle, over wood decking	NAD
4638-R-37	Roof shingle	On upper roof, over felt and wood decking	NAD
4638-R-38	Roofing felt	On upper roof, under asphalt shingle, over wood decking	NAD
4638-E-39	Caulking material	Exterior, at corners of aluminum siding	NAD
4638-E-40	Caulking material	Exterior, around aluminum frame	NAD

Samples testing positive for asbestos indicated in **BOLD** type

NAD = No Asbestos Detected

**TABLE 2**  
**ACM QUANTITY SUMMARY**  
**FORT BRAGG, BUILDING A-4638**

Material Description	UNITS	Area Descriptions				
		Mechanical Room	Interior	Exterior		TOTALS
Drywall Joint Compound	S.F.	0	10,500	0		10,500 S.F.
Stippled Ceiling Surfacing	S.F.	0	660	0		660 S.F.
Floor Tile & Mastic	S.F.	0	4,000	0		4,000 S.F.
Fiberboard Adhesive	S.F.	0	425	0		100 S.F.
Flashing Cement	S.F.	0	0	1		1 S.F.
Duct Flex Joint	L.F.	16	0	0		16 L.F.
Cement Board	S.F.	800	0	0		800 S.F.

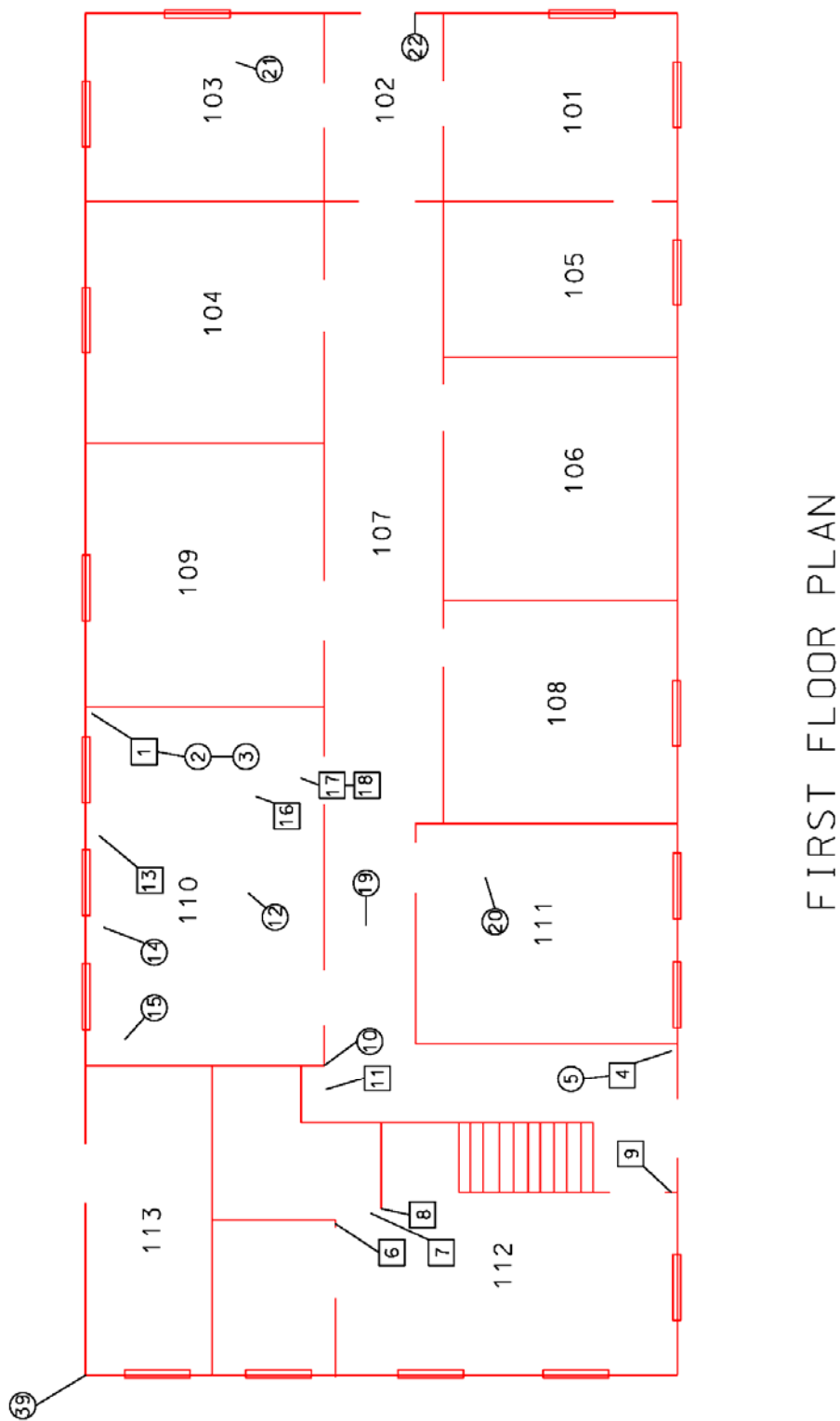
**S.F. = Square Foot, L.F. = Linear Foot, C.F. = Cubic Foot**

**TABLE 3**  
**MATERIAL CHARACTERIZATION AND ASSESSMENT**  
**FORT BRAGG, BUILDING A-4638**

<b>MATERIAL</b>		<b>CHARACTERISTICS</b>			<b>ASSESSMENT</b>	
<b>Type</b>	<b>Description</b>	<b>Asbestos Yes/No/Assumed</b>	<b>Quantity (If ACM)</b>	<b>Friable / Non-friable</b>	<b>Condition</b>	<b>Disturbance Potential</b>
Miscellaneous	Drywall Joint Compound	Yes	10,500 S.F.	Friable	Good	Moderate
Surfacing	Stippled Ceiling Surfacing	Yes	660 S.F.	Friable	Significantly Damaged	High
Miscellaneous	Floor Tile & Mastic	Yes	4,000 S.F.	Non-Friable	Good	Low
Miscellaneous	Fiberboard Adhesive	Yes	100 S.F.	Non-Friable	Good	Low
Miscellaneous	Flashing Cement	Assumed	1 S.F.	Non-Friable	Good	Low
Miscellaneous	Duct Flex Joint	Assumed	16 L.F.	Non-Friable	Good	Low
Miscellaneous	Cement Board	Assumed	800 S.F.	Non-Friable	Good	Low

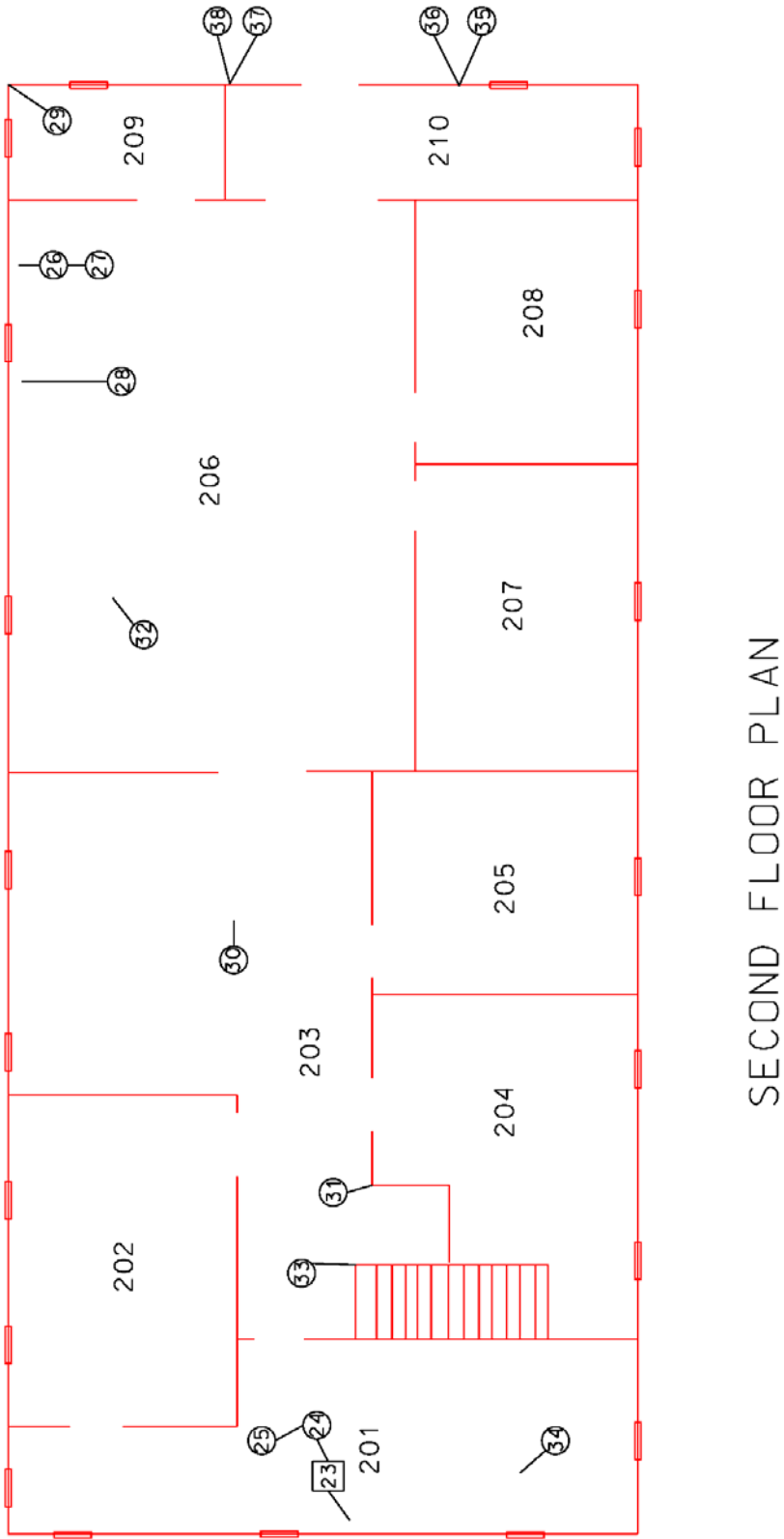
**S.F. = Square Foot, L.F. = Linear Foot, C.F. = Cubic Foot, Ea. = Each**

Figure 1



FIRST FLOOR PLAN

Figure 2



SECOND FLOOR PLAN



# **Appendix A**

## **Laboratory's Analytical Report**

CAROLINA ENVIRONMENTAL, INC.  
107 New Edition Court, Cary, NC 27511  
Phone: (919) 481-1413 Fax: (919) 481-1442

## LABORATORY REPORT ASBESTOS BULK ANALYSIS

Client: **US Army Corps of Engineers - Savannah**  
**District - EMU9**  
200 North Cobb Parkway, Bldg. 400 Ste. 404  
Marietta, GA 30062

CEI Lab Code: A10-0689  
Received: 02-01-10  
Analyzed: 02-03-10  
Reported: 02-03-10  
Analyst: Lisa Ismail

Project: Ft. Bragg Building A-4638; 10178

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS	
4638-1-1	A991084A	<u>FLOOR TILE</u> Homogeneous, Grey, Fibrous, Tightly Bound CHRY 2% VINYL 98 %	CHRY	2%
	A991084B	<u>MASTIC</u> Homogeneous, Black, Fibrous, Bound MAST 95 % CELL 5 %	ND	
4638-1-2	A991085	<u>MASTIC</u> Homogeneous, Black, Tan, Fibrous, Bound BIND 98 % CELL 2 %	ND	
4638-1-3	A991086	<u>FELT PAPER</u> Homogeneous, Black, Fibrous, Bound TAR 20 % CELL 80 %	ND	
4638-1-4	A991087A	<u>FLOOR TILE</u> Homogeneous, Grey, Fibrous, Tightly Bound CHRY 2% VINYL 98 %	CHRY	2%
	A991087B	<u>MASTIC</u> Homogeneous, Black, Fibrous, Bound MAST 95 % CELL 5 %	ND	

CAROLINA ENVIRONMENTAL, INC.  
107 New Edition Court, Cary, NC 27511  
Phone: 919-481-1413 Fax: 919-481-1442

Project: Ft. Bragg Building A-4638; 10178

Lab Code: A10-0689

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
4638-1-5	A991088	<u>MASTIC</u> Homogeneous, Black, Tan, Fibrous, Bound BIND 98 % CELL 2 %	ND
4638-1-6	A991089	<u>DRYWALL JOINT COMPOUND</u> Heterogeneous, White, Tan, Fibrous, Bound CHRY 2% PAINT 10 % BIND 88 %	CHRY 2%
4638-1-7	A991090	<u>DRYWALL JOINT COMPOUND</u> Heterogeneous, White, Tan, Fibrous, Bound CHRY 2% PAINT 10 % BIND 88 %	CHRY 2%
4638-1-8	A991091A	<u>FIBERBOARD</u> Heterogeneous, White, Tan, Fibrous, Bound PAINT 10 % CELL 90 %	ND
	A991091B	<u>ADHESIVE</u> Homogeneous, Grey, Fibrous, Bound CHRY 2% MAST 98 %	CHRY 2%
4638-1-9	A991092	<u>GYPSUM BOARD/JOINT COMPOUND</u> Heterogeneous, White, Tan, Fibrous, Bound CHRY <1% PAINT 10 % CELL 10 % BIND 15 % GYPSUM 65 %	CHRY <1%
CHRY 2% in Joint Compound only. Sample contains CHRY <1% overall.			
4638-1-10	A991093	<u>DRYWALL JOINT COMPOUND</u> Heterogeneous, White, Tan, Non-fibrous, Bound PAINT 10 % BIND 90 %	ND

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107 New Edition Court, Cary, NC 27511  
Phone: 919-481-1413 Fax: 919-481-1442

Project: Ft. Bragg Building A-4638; 10178

Lab Code: A10-0689

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS	
4638-1-11	A991094	<u>DRYWALL JOINT COMPOUND</u> Heterogeneous, White, Tan, Fibrous, Bound	CHRY	2%
		CHRY 2% PAINT 10 % BIND 88 %		
4638-1-12	A991095	<u>CEILING TILE</u> Heterogeneous, White, Grey, Fibrous, Bound	ND	
		PAINT 10 % CELL 45 % PERL 20 % FBGL 25 %		
4638-1-13	A991096	<u>TEXTURED CEILING SURFACING</u> Heterogeneous, Off-white, Fibrous, Bound	CHRY	3%
		CHRY 3% PAINT 15 % BIND 82 %		
4638-1-14	A991097	<u>CEILING TILE</u> Heterogeneous, White, Tan, Fibrous, Bound	ND	
		PAINT 10 % CELL 30 % MAST 35 % FBGL 25 %		
4638-1-15	A991098A	<u>CEILING TILE</u> Heterogeneous, White, Grey, Fibrous, Bound	ND	
		PAINT 15 % CELL 50 % FBGL 35 %		
	A991098B	<u>MASTIC</u> Heterogeneous, Brown, Non-fibrous, Bound	ND	
		MAST 100 % CELL <1 %		
4638-1-16	A991099	<u>TEXTURED CEILING SURFACING</u> Heterogeneous, Off-white, Fibrous, Bound	CHRY	3%
		CHRY 3% PAINT 15 % BIND 82 %		

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Lab Code: A10-0689

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS	
4638-1-17	A991100	<u>TEXTURED CEILING SURFACING</u> Heterogeneous, Off-white, Fibrous, Bound	CHRY	3%
		CHRY 3% PAINT 15 % BIND 82 %		
4638-1-18	A991101	<u>DRYWALL JOINT COMPOUND</u> Heterogeneous, White, Tan, Fibrous, Bound	CHRY	2%
		CHRY 2% PAINT 10 % BIND 88 %		
4638-1-19	A991102	<u>DUCT SEALER</u> Homogeneous, Grey, Non-fibrous, Bound	ND	
		BIND 100 %		
4638-1-20	A991103	<u>TEXTURED CEILING SURFACING</u> Heterogeneous, White, Non-fibrous, Bound	ND	
		PAINT 10 % BIND 90 %		
4638-1-21	A991104	<u>TEXTURED CEILING SURFACING</u> Heterogeneous, White, Non-fibrous, Bound	ND	
		PAINT 10 % BIND 90 %		
4638-1-22	A991105	<u>CAULKING MATERIAL</u> Homogeneous, White, Non-fibrous, Bound	ND	
		CAULK 100 %		
4638-2-23	A991106A	<u>FLOOR TILE</u> Homogeneous, Grey, Fibrous, Tightly Bound	CHRY	2%
		CHRY 2% VINYL 93 % CELL 5 %		

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Lab Code: A10-0689

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS	
	A991106B	<u>MASTIC</u> Homogeneous, Black, Fibrous, Bound	CHRY	5%
		CHRY 5% MAST 95 %		
4638-2-24	A991107	<u>SHEET VINYL FLOORING</u> Heterogeneous, Green, Tan, Fibrous, Bound	ND	
		VINYL 50 % CELL 45 % MAST 5 %		
4638-2-25	A991108	<u>FELT PAPER</u> Homogeneous, Black, Fibrous, Bound	ND	
		TAR 20 % CELL 80 %		
4638-2-26	A991109A	<u>FLOOR TILE</u> Homogeneous, Green, Fibrous, Tightly Bound	ND	
		VINYL 95 % CELL 5 %		
	A991109B	<u>MASTIC</u> Homogeneous, Black, Fibrous, Bound	CHRY	5%
		CHRY 5% MAST 95 %		
4638-2-27	A991110	<u>SHEET VINYL FLOORING</u> Heterogeneous, Green, Tan, Fibrous, Bound	ND	
		VINYL 50 % CELL 45 % MAST 5 %		
4638-2-28	A991111	<u>CAULKING MATERIAL</u> Homogeneous, White, Non-fibrous, Bound	ND	
		CAULK 90 % PAINT 10 %		

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Project: Ft. Bragg Building A-4638; 10178

Lab Code: A10-0689

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
4638-2-29	A991112	<u>GYPSUM BOARD/JOINT COMPOUND</u> Heterogeneous, White, Tan, Fibrous, Bound	CHRY <1%
CHRY 2% in Joint Compound only. Sample contains CHRY <1% overall.		CHRY <1% PAINT 10 % CELL 10 % BIND 15 % GYPSUM 65 %	
4638-2-30	A991113	<u>FIBERBOARD</u> Heterogeneous, Off-white, Brown, Fibrous, Bound	ND
		PAINT 20 % CELL 80 %	
4638-2-31	A991114	<u>GYPSUM BOARD/JOINT COMPOUND</u> Heterogeneous, White, Tan, Fibrous, Bound	CHRY <1%
CHRY 2% in Joint Compound only. Sample contains CHRY <1% overall.		CHRY <1% PAINT 10 % CELL 10 % BIND 15 % GYPSUM 65 %	
4638-2-32	A991115	<u>CEILING TILE</u> Heterogeneous, White, Grey, Fibrous, Bound	ND
		PAINT 10 % CELL 45 % PERL 20 % FBGL 25 %	
4638-S-33	A991116	<u>FIBERBOARD</u> Heterogeneous, Off-white, Brown, Fibrous, Bound	ND
		PAINT 10 % CELL 75 % MAST 5 % BIND 10 %	
4638-2-34	A991117	<u>FIBERBOARD</u> Heterogeneous, Off-white, Brown, Fibrous, Bound	ND
		PAINT 20 % CELL 80 %	
4638-R-35	A991118	<u>ROOF SHINGLE</u> Heterogeneous, Black, White, Fibrous, Bound	ND
		GRAV 15 % FBGL 30 % TAR 55 %	

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Project: Ft. Bragg Building A-4638; 10178

Lab Code: A10-0689

CLIENT ID	CEI LAB ID	HOMOGENEITY DESCRIPTION	% ASBESTOS
4638-R-36	A991119 Homogeneous,	<u>ROOFING FELT</u> Black, Fibrous, Bound TAR 40 % CELL 60 %	ND
4638-R-37	A991120 Heterogeneous,	<u>ROOF SHINGLE</u> Black, White, Fibrous, Bound GRAV 15 % FBGL 30 % TAR 55 %	ND
4638-R-38	A991121 Homogeneous,	<u>ROOFING FELT</u> Black, Fibrous, Bound TAR 40 % CELL 60 %	ND
4638-E-39	A991122 Homogeneous,	<u>CAULKING MATERIAL</u> White, Non-fibrous, Bound CAULK 100 %	ND
4638-E-40	A991123 Homogeneous,	<u>CAULKING MATERIAL</u> White, Non-fibrous, Bound CAULK 100 %	ND



**The following definitions apply to the abbreviations used in the ASBESTOS BULK ANALYSIS REPORT:**

CHRY = Chrysotile	CELL = Cellulose	DEBR = Debris
AMOS = Amosite	FBGL = Fibrous Glass	BIND = Binder
CROC = Crocidolite	CACO = Calcium Carbonate	SILI = Silicates
TREM = Tremolite	SYNT = Synthetics	GRAV = Gravel
ANTH = Anthophyllite	WOLL = Wollastonite	MAST = Mastic
ACTN = Actinolite	CERWL = Ceramic Wool	PLAS = Plaster
N D = None Detected	NTREM = Non-Asbestiform Tremolite	PERL = Perlite
NANTH = Non-Asbestiform Anthophyllite	FBGY = Fibrous Gypsum	RUBR = Rubber
		VER = Vermiculite

**CLIENT:** US Army Corps of Engineers - Savannah District - EMU9

**PROJECT:** Ft. Bragg Building A-4638; 10178

**CEI LAB CODE:** A10-0689

Stereoscopic microscopy and polarized light microscopy coupled with dispersion staining is the analytical technique used for sample identification. The percentage of each component is visually estimated by volume. These results pertain only to the samples analyzed. The samples were analyzed as submitted by the client and may not be representative of the larger material in question. Unless notified in writing to return samples, Carolina Environmental, Inc. will discard all bulk samples after 30 days.

Many vinyl floor tiles have been manufactured using greater than 1% asbestos. Often the asbestos was milled to a fiber size below the detection limit of polarized light microscopy. Therefore, a "None Detected" (ND) reading on vinyl floor tile does not necessarily exclude the presence of asbestos. Transmission electron microscopy provides a more conclusive form of analysis for vinyl floor tiles.

It is certified by the signature below that Carolina Environmental, Inc. is accredited by the National Voluntary Accreditation Program (NVLAP) for the analysis of asbestos in bulk materials. The accredited test method is EPA / 600 / M4-82 / 020 for the analysis of asbestos in building materials. Procedures described in EPA / 600 / R-93 / 116 have been incorporated where applicable. The detection limit for the method is 0.1% (trace amount). Carolina Environmental, Inc.'s NVLAP accreditation number is #101768-0. This report is not to be used to claim product endorsement by NVLAP or any agency of the U. S. Government. This report and its contents are only valid when reproduced in full. Dust and soil analyses for asbestos using PLM are not covered under NVLAP accreditation.

**ANALYST**



**REVIEWED BY**



Tianbao Bai, Ph.D.  
Laboratory Director

**End of Report**

# **Appendix B**

## **Sample Chain of Custody Forms**

A10 0689 (40)  
A991084.A 991123

**ASBESTOS CHAIN OF CUSTODY - US ARMY CORPS OF ENGINEERS**

Project: <b>Ft Bragg Building A-4638</b>	Job No.: <b>10178</b>
Sampler: <b>Tim Jones</b>	Analysis: <b>PLM</b>

DATE	FIELD ID	EMU ID	COMPONENTS/NOTES
1/26/2010	4638-1-1	62591	Floor tile & mastic
1/26/2010	4638-1-2	62592	Black mastic?
1/26/2010	4638-1-3	62593	Felt paper
1/26/2010	4638-1-4	62594	Floor tile & mastic
1/26/2010	4638-1-5	62595	Black mastic?
1/26/2010	4638-1-6	62596	Drywall joint compound
1/26/2010	4638-1-7	62597	Drywall joint compound
1/26/2010	4638-1-8	62598	Fiberboard & adhesive
1/26/2010	4638-1-9	62599	Gypsum board & joint compound
1/26/2010	4638-1-10	62600	Drywall joint compound
1/26/2010	4638-1-11	62601	Drywall joint compound
1/26/2010	4638-1-12	62602	Ceiling tile
1/26/2010	4638-1-13	62603	Textured ceiling surfacing
1/26/2010	4638-1-14	62604	Ceiling tile
1/26/2010	4638-1-15	62605	Ceiling tile
1/26/2010	4638-1-16	62606	Textured ceiling surfacing
1/26/2010	4638-1-17	62607	Textured ceiling surfacing
1/26/2010	4638-1-18	62608	Drywall joint compound
1/26/2010	4638-1-19	62609	Duct sealer
1/26/2010	4638-1-20	62610	Textured ceiling surfacing
1/26/2010	4638-1-21	62611	Textured ceiling surfacing
1/26/2010	4638-1-22	62612	Caulking material

Relinquished By	Date	Time	Received By	Date	Time
<i>Tim Jones</i>	<i>1-29-10</i>	<i>1400</i>	<i>Kurtis Rott</i>	<i>02/01/10</i>	<i>3:20 PM</i>

--

A10.0689

**ASBESTOS CHAIN OF CUSTODY - US ARMY CORPS OF ENGINEERS**

Project: <b>Ft Bragg Building A-4638</b>	Job No.: <b>10178</b>
Sampler: <b>Tim Jones</b>	Analysis: <b>PLM</b>

DATE	FIELD ID	EMU ID	COMPONENTS/NOTES
1/26/2010	4638-2-23	62613	Floor tile & mastic
1/26/2010	4638-2-24	62614	Sheet vinyl flooring
1/26/2010	4638-2-25	62615	Felt paper
1/26/2010	4638-2-26	62616	Floor tile & mastic
1/26/2010	4638-2-27	62617	Sheet vinyl flooring
1/26/2010	4638-2-28	62618	Caulking material
1/26/2010	4638-2-29	62619	Gypsum board & joint compound
1/26/2010	4638-2-30	62620	Fiberboard
1/26/2010	4638-2-31	62621	Drywall joint compound
1/26/2010	4638-2-32	62622	Ceiling tile
1/26/2010	4638-S-33	62623	Fiberboard & adhesive
1/26/2010	4638-2-34	62624	Fiberboard
1/26/2010	4638-R-35	62625	Roof shingle
1/26/2010	4638-R-36	62626	Roofing felt
1/26/2010	4638-R-37	62627	Roof shingle
1/26/2010	4638-R-38	62628	Roofing felt
1/26/2010	4638-E-39	62629	Caulking material
1/26/2010	4638-E-40	62630	Caulking material

Relinquished By	Date	Time	Received By	Date	Time
<i>Tim Jones</i>	1-29-10	1400			

--

# **Appendix C**

## **Certifications & Accreditations**



North Carolina Department of Health and Human Services  
Division of Public Health · Epidemiology Section  
Occupational and Environmental Epidemiology Branch  
1912 Mail Service Center · Raleigh, North Carolina 27699-1912  
Tel 919-707-5950 · Fax 919-870-4808

Beverly Eaves Perdue, Governor  
Lanier M. Cansler, Secretary

Jeffrey P. Engel, M.D.  
State Health Director

October 26, 2009

Timothy A Jones  
4411 Smoke Stone Court  
Marietta, GA 30062

Dear Mr. Jones:

Based upon the review of your accreditation application, the Health Hazards Control Unit (HHCU) has determined that you have fulfilled the requirements and are eligible for asbestos accreditation as a(n) INSPECTOR. Your assigned North Carolina accreditation number is 12210, which is reflected on your enclosed North Carolina Accreditation card. Please be sure to take this card with you to any asbestos work site where you are employed. The State requires that all persons conducting asbestos abatement or asbestos management activities be accredited and have their identification card on site.

Your North Carolina Inspector accreditation will expire on SEPTEMBER 30, 2010. It is NOT the policy of the HHCU to issue renewal notices. If you wish to continue working as a(n) Inspector after this expiration date, you must successfully complete the required training and submit a completed application to this office prior to September 30, 2010. If you should continue to perform asbestos management activities as a(n) Inspector without a valid North Carolina accreditation, you will be in violation of State regulations and may be cited for noncompliance.

Sincerely,

A handwritten signature in black ink, appearing to read "Marita E Cheek".

Marita E Cheek  
Accreditation/Certification Secretary  
Health Hazards Control Unit

Enclosure

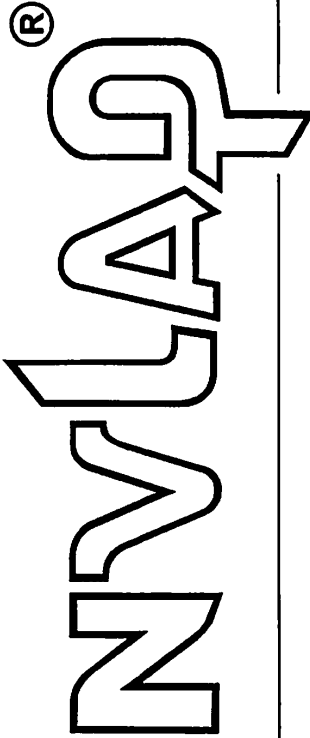


North Carolina Public Health  
Working for a healthier and safer North Carolina  
Everywhere. Everyday. Everybody.

Location: 5505 Six Forks Road, 2nd Floor, Room D-1 · Raleigh, N.C. 27609



United States Department of Commerce  
National Institute of Standards and Technology



## Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 101768-0

**Carolina Environmental, Inc.**

Cary, NC

*is accredited by the National Voluntary Laboratory Accreditation Program for specific services,  
listed on the Scope of Accreditation, for:*

### **BULK ASBESTOS FIBER ANALYSIS**

*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.  
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality  
management system (refer to joint ISO-ILAC-IAF Communiqué dated January 2009).*



2009-04-01 through 2010-03-31

*Effective dates*

*Jolly S. Bruce*  
For the National Institute of Standards and Technology

NVLAP-01C (REV. 2009-01-28)



**US Army Corps  
of Engineers®**

# **Savannah District Environmental and Materials Unit**

## ***Hazardous Building Materials Survey***

# **Building No. A-4638 Fort Bragg, North Carolina**

**Prepared by Timothy A. Jones**





The contents of this report are not to be used for advertising, publication, or promotional purposes. Citation of trade names does not constitute an official endorsement or approval of the use of such commercial products.

The findings of this report are not to be construed as an official Department of the Army position, unless so designated by other authorized documents.

**Hazardous Building Materials Survey**

**January 2010**

**Building No. A-4638  
Fort Bragg, North Carolina**

Final Report

**Prepared for: U.S. Army Corps of Engineers  
Savannah District**

# Hazardous Building Materials Survey Report

---

## Introduction

### Background

Building A-4638 is an approximately 4,720 square foot two-story wood framed structure with a wooden flooring system and asphalt shingle roofing system. The building is currently as office space. Ceilings are drop ceilings with hung ceiling tiles on a metal grid. Original drywall ceilings exist above the drop ceiling, in some parts, the ceilings have been covered with stippled ceiling surfacing and perforated ceiling tiles in other areas. The floors are currently covered with carpet, over tile over original green battleship vinyl. The raised parts of the floor generally have plywood fixed over the original vinyl floor underneath the carpet. The exterior of the structure is aluminum siding over wood siding. The building was reportedly constructed in 1941.

## Description of study

### Investigation

This report documents the hazardous building materials survey of Building No. A-4638 at Fort Bragg, North Carolina conducted on 26 January 2010 by U.S. Army Corps of Engineers, Savannah District employee Tim Jones. This report includes only building materials located at the time of inspection. The investigation includes a visual identification and location of such items as: fluorescent and mercury-vapor lights, including possible PCB containing ballasts; battery back-up exit lights and emergency lights; mercury-containing thermostats and switches; refrigerant containing air conditioners, water fountains and ice makers; above and below ground storage tanks; transformers; built in chemical type fire suppression systems; smoke detectors; and lead building materials. Other hazardous building materials not listed above may also be included at the discretion of the inspectors. Asbestos is excluded from this inspection as it is covered separately in an asbestos inspection report.

## Conclusions

The following information was gathered during the survey of Building A-4638:

- a. *Light Count:* The fluorescent and mercury vapor light count results are presented in Table 1. All ballasts are assumed to contain PCBs.
- b. *Compressed Refrigerant Gas:* (17) Small window air conditioners were located within the building. (3) Small refrigerators were located within the building.
- c. *Mercury Thermostats:* (1) Mercury-containing thermostats were located in the building.
- d. *Fire Extinguishers:* (3) Portable fire extinguishers were located in the building.
- e. *Chemicals:* (8) 1 gallon containers of window cleaner, (4) Freon tanks, (1) nitrogen tank and (1) oxygen tank was located in the mechanical room of the building.
- f. *Alarm Panel:* (1) Alarm panel was located within the building.
- g. *Batteries:* (1) Small APC battery was located within the building.
- h. *Lead Materials:* (1) Lead flashing was located on the roof of the building. Approximately (75) poured lead joints are assumed to exist in the plumbing, drainage, waste and vent piping.
- i. *Smoke Detectors:* (27) Smoke detectors were located within the building.

# Tables

**TABLE 1**  
**FORT BRAGG BUILDING A-4638**  
**FLUORESCENT LIGHT FIXTURES**

<b>AREA IDENTIFICATION</b>	<b># &amp; TYPE LIGHTS PRESENT</b>	<b>DESCRIPTION OF LIGHTS</b>
Interior	78	2 bulb, 4' light
Interior	17	Emergency/Exit Lights
Interior	1	Screw in Halogen Lights
Interior	1	Box of unused 4 ft. bulbs
Exterior	2	Mercury Lights

## **APPENDIX BB**

### **North Carolina Division of Water Quality Stormwater Best Management Practices Manual**

The manual is available online at:

<http://portal.ncdenr.org/web/wq/ws/su/bmp-manual>



DEPARTMENT OF THE ARMY  
INSTALLATION MANAGEMENT AGENCY  
HEADQUARTERS, FORT BRAGG GARRISON COMMAND (AIRBORNE)  
FORT BRAGG, NORTH CAROLINA 28310

REPLY TO  
ATTENTION OF:

IMSE-BRG-PWE

11 Sep 06

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Updated Asbestos and Permitting Procedures for Use of  
the Fort Bragg Lamont Road Landfill Facility

1. References:

a. North Carolina Solid Waste Management Rules, 15 North  
Carolina Administrative Code (NCAC) 13B.

b. North Carolina Department of Environment and Natural  
Resources, Construction and Demolition Operational Permit #26-  
08.

c. National Emission Standards for Hazardous Air Pollutants  
40 CFR Part 61. Subpart M.

d. Occupational Safety and Health Administration 29 CFR  
1910.1200 and 29 CFR 1926.1101.

e. North Carolina Department of Health and Human Services  
Asbestos Hazard Management Program per 10A NCAC 41C.0605.

2. Effective 25 September 2006, the Directorate of Public Works  
(DPW) will implement updated procedures for the handling,  
transportation, and disposal of Friable and Non-Friable Asbestos  
on Fort Bragg. Updated procedures are located in Enclosure 1.  
Procedures are also available via web at  
[www.bragg.army.mil/envbr/solidwaste.aspx](http://www.bragg.army.mil/envbr/solidwaste.aspx) (user should access the  
Solid Waste Training for Landfill Users/Asbestos Information).

3. Effective 11 September 2006, new scale systems at the Lamont  
Road Facility will be operational. The DPW has begun the  
initial phase of landfill user re-permitting for contractors.  
Landfill users are required to know and follow all rules and  
regulations pertaining to the landfill. Updated procedures and  
timeframes for obtaining new permits are located at Enclosure 2.

a. All prime contractors utilizing the Fort Bragg Landfill  
will be required to review landfill procedures prior to

IMSE-BRG-PWE

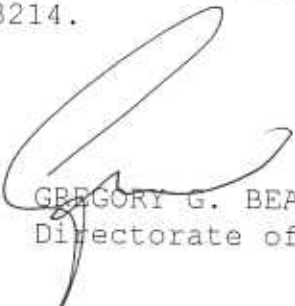
SUBJECT: Updated Asbestos and Permitting Procedures for Use of the Fort Bragg Lamont Road Landfill Facility

obtaining a new permit and all subs-contractors are encouraged to review the landfill procedures for knowledge.

b. All government personnel issuing a contract that includes access to the landfill by a contractor should review the procedures for knowledge.

c. Military and civil service personnel accessing the landfill in government-owned vehicles are not required to have a permit. However, they are encouraged to review the "Solid Waste Training for Landfill Users" available via web at [www.bragg.army.mil/envbr/solidwaste.aspx](http://www.bragg.army.mil/envbr/solidwaste.aspx) to ensure compliance.

4. Point of contact for this action is Sid Williamson at 396-3372 or Christine Hull at 907-3214.



GREGORY G. BEAN  
Directorate of Public Works

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DOD Schools  
Picerne Family Housing  
43d CS, Pope AFB



### 1-1. Management Procedures for Friable and Non-friable Asbestos for Disposal at the Fort Bragg Landfill

**Purpose:** Ensure compliance with all applicable regulations concerning loading, unloading, transporting and disposal of friable and non-friable asbestos containing material (ACM) on Fort Bragg.

### 1-2. Regulatory Requirements

❖ National Emission Standards for Hazardous Air Pollutants (NESHAP) 40 CFR Part 61.Subpart M.

❖ OSHA 29 CFR 1910.1200 and CFR 1926.1101.

❖ North Carolina Solid Waste Management Rules, 15 NCAC 13B.

❖ North Carolina Department of Environment and Natural Resources (NCDENR), Construction and Demolition Operational Permit #26-08.

❖ North Carolina Department Health and Human Services Asbestos Hazard Management Program per 10A NCAC 41C.0605.

### 1-3. Management of Friable Asbestos

#### 1-3-1. Loading of Friable Asbestos at the Work Site

❖ The Contractor is responsible for:

o Excluding public access by barriers or warning tape and posting proper signs.

o Ensuring contractor personnel have proper training.

o Ensuring all friable asbestos is adequately wet during removal, packaging and loading process.

o Ensuring any driver who transports asbestos containing material (ACM) is trained (Awareness Level Training), have completed **Fort Bragg Asbestos Removal, Transportation and Disposal Documentation Form** and has a valid Fort Bragg landfill Permit.

o Ensuring all waste is adequately wet and in properly labeled 6 mil plastic bags and covered prior to trucks departing construction site.

o Ensuring the vehicle used to transport has proper OSHA signs prior to departing construction site

Danger Asbestos Cancer And Lung Disease Hazard Authorized Personnel Only
---

### 1.3.2. Management of Friable Asbestos during Transportation

- ❖ **Truck Operator (The Contractor) is responsible for:**
  - o Calling Landfill Manager 24 hours in advance to schedule disposal. Estimating quantity (i.e. number of trucks and size)
  - o Obtaining a valid Fort Bragg Landfill Permit
  - o Ensuring that all material is adequately wet while packaging and discharges no visible emission during loading.
  - o Ensuring all friable asbestos material is sealed in leak-tight containers.
  - o Ensuring truck is covered.
  - o Labeling the vehicle with required OSHA Asbestos signs.
  - o Posting signs in the area during loading and unloading.
  - o Completing the **Fort Bragg Asbestos Removal, Transportation and Disposal Documentation Form** Section 1 and 2.
  - o Completing NC Asbestos Waste Shipment Record prior to leaving construction site.

### 1-3.3 Management of Friable Asbestos during Disposal - At the Scale House:

- ❖ **Scale House Operator is responsible for:**
  - o Checking for valid Fort Bragg Landfill Permit.
  - o Receiving NC Asbestos Waste Shipment Record from the driver and ensuring that driver has completed Block 10 and 11.
  - o Receiving **Fort Bragg Asbestos Removal, Transportation and Disposal Documentation Form** (parts 1 and 2 complete) from the driver and recording inbound weight.
  - o Giving the driver the "FRIABLE ASBESTOS CONTAINING MATERIALS" sign to display in truck windshield.
  - o Directing the driver to appropriate disposal area.

### 1-3-4. C&D Landfill Operations for Disposal of Friable Asbestos

- ❖ **At Asbestos Disposal Area of Landfill**
  - o Driver is instructed by landfill personnel to proceed to posted asbestos disposal area.
  - o Driver is instructed by landfill personnel to unload asbestos that is properly bagged and wetted.
  - o Landfill operator covers friable asbestos immediately with at least 6 inches of clean cover material (soil)
  - o Driver is directed back to scale house by landfill operator.
  - o Landfill manager ensures that asbestos disposal areas are properly annotated on maps.

### 1-3-5. C&D Landfill Operations for Disposal of Friable Asbestos

- ❖ **At the Scale House:**
  - o Driver returns to Scale House.

- o Scale House Operator records outbound weight, calculates and records ACM (asbestos containing material) weight on Block 13 of *NC Asbestos Waste Shipment Record*, and signs Section 3 of the *Fort Bragg Asbestos Removal, Transportation and Disposal Documentation Form*.

- o Scale House Operator retains one (1) copy of the *NC Asbestos Waste Shipment Record* and returns remaining copies to the driver.

- o Scale House Operator receives the "FRIABLE ASBESTOS CONTAINING MATERIALS" sign from the outbound driver.

- o Scale House Operator provides the *NC Asbestos Waste Shipment Record* and the *Fort Bragg Asbestos Removal, Transportation and Disposal Documentation Form* to the C&D Operator at the close of business for signature. (Staple these two forms together and retained by Landfill for record.)

## 2-1. Management of Non-Friable Asbestos

### 2-1-1. Management of Non-Friable Asbestos at the Work Site

The Contractor is responsible for:

- ❖ Excluding public access by barriers or posting warning tape.
- ❖ Ensuring contractor personnel have proper training.
- ❖ Ensuring all building debris must be wetted inside and out during the demolition and loading process.
- ❖ Coordinating with DPW-FMD prior to using any fire hydrant. Note: use of fire hydrants requires a back flow-prevention device and during times of water restrictions on Fort Bragg, contractor must use non-potable water sources (lakes) to obtain water.
- ❖ Ensuring any drivers transporting non-friable asbestos is properly trained (Awareness Level Training).
- ❖ Ensuring driver has a completed *Fort Bragg Asbestos Removal, Transportation and Disposal Documentation Form* and has a valid Fort Bragg landfill Permit.

### 2-1-2. Management of Non-Friable Asbestos during Transportation

- ❖ **Truck Operator is responsible for:**
  - o Calling Landfill Manager 24 hours in advance to schedule disposal. Estimating quantity (i.e. number of trucks and size).
  - o Obtaining valid Fort Bragg landfill permit
  - o Ensuring that all material is adequately wet while loading and ensure no visible emission occur during loading and transport.
  - o Ensuring truck is covered.
- ❖ Completing the *Fort Bragg Asbestos Removal Transportation and Disposal Documentation Form* Section 1 and 2.

### 2-1-3. Management of Non-friable Asbestos during Disposal

#### ❖ At the Scale house:

- o Receives *Fort Bragg Asbestos Removal, Transportation and Disposal Documentation Form* from the driver with section 1 and 2 completed.

- o Checks for valid Landfill Permit.

- o Gives the driver the "**NON-FRIABLE ASBESTOS CONTAINING MATERIALS**" sign to display in truck windshield and records inbound weight and directs the driver to the appropriate disposal area.

### 2-1-4. C&D Landfill Operations Non-friable Asbestos Disposal

#### ❖ At Asbestos Disposal Area

- o Driver is directed by scale house personnel to proceed to regular C&D Area.

- o Landfill operator designates specific area for disposal.

- o Landfill operator covers non-friable asbestos containing material at the end of the working day with 6 inches of C&D waste or clean cover material.

- o Landfill manager ensures that asbestos disposal areas are properly annotated on maps.

- o Landfill operator directs driver to scale house.

### 2-1-5. C&D Landfill Operations Non-friable Asbestos Disposal

#### ❖ At the Scale House:

- o Scale House Operator records outbound weight and Collects and signs Section 3 of the *Fort Bragg Asbestos Removal Transportation and Disposal Documentation Form*.

- o Scale House Operator receives the "**NON-FRIABLE ASBESTOS CONTAINING MATERIALS**" sign from the outbound driver.

- o Scale House Operator provides the *Fort Bragg Asbestos Removal Transportation and Disposal Documentation Form* to the C&D Operator at the close of business for signatures.

#### Points of Contact:

- ❖ Bruce Billings Asbestos Program Manager ECB, Building 3-1137 Reilly Road, Fort Bragg, NC, Phone: (910) 432-8467, FAX: 396-4188

- ❖ Gary Cullen Air Program Manager ECB Building 3-1137 Reilly Road, Fort Bragg, NC, Phone: (910) 907-3645, FAX: 396-4188

- ❖ Christine Hull, Chief, Environmental Compliance Branch, Building 3-1137 Reilly Road, Fort Bragg, NC, Phone: (910) 907-3214, FAX: 396-4188

- ❖ NC Department of Health and Human Services Health Hazards Control Unit Occupational and Environmental Epidemiology Branch Phone: (919) 707-5950, FAX: (919) 870-4808

## Fort Bragg Landfill Usage Permits / Landfill User Training

### Updated Permitting Procedures – Scale System

#### Landfill Permits:

The Directorate of Public Works is currently implementing a new permit system for landfill users. This implementation began in August 2006 with training sessions for contractors and personnel with oversight responsibilities. The DPW began issuing new permits on 7 September 2006 and will continue to process permit applications for existing users through 1 November 2006. All contracts awarded or issued to proceed after 7 September 2006 must utilize the new system for obtaining permits.

Landfill permits will be issued only after landfill users have reviewed Fort Bragg's solid waste regulations. As a permitted landfill in the state of North Carolina, it is important that all users understand the permit requirements and abide by these regulations. This information is available on new web-based/CD tutorial. Upon completion of the tutorial, users will be prompted to print a Certificate of Completion.

Landfill permits will be issued only to prime contractors, who will, in turn, be responsible for ensuring that subcontractors understand and comply with Fort Bragg's landfill regulations. For government agencies who contract for specific projects (i.e., renovations in an AAFES, DECA, or DoD school) the same requirements will apply to any contractors. For government agencies utilizing roll-off containers for their waste management, the agency contracting for this service will be responsible for obtaining the permit and ensuring the driver has the permit when entering the landfill. The driver will be responsible for returning the permit to the agency.

All new permits will be issued with an electronic Landfill Usage Code (LUC) that is unique for each vehicle and each contract. Implementation of the new permit system and LUC's will be phased. Temporary LUC's will be assigned to the following agencies and will be used until the dates listed below, at which time the temporary LUC's will terminate. The listed agencies are expected to have all landfill users re-permitted by their listed date. Existing permits will no longer be valid after the following dates (by organization):

<i>Termination Date</i>	<i>Agency</i>	<i>Landfill Usage Code</i>
9/12/06	AAFES	0912
9/18/06	DECA	0918
9/25/06	DoD Schools	0925
10/02/06	Pope	1002
10/09/06	Picerne/RCI	1009
10/16/06	Customer Service	1016
10/23/06	DOC	1023
10/30/06	COE	1030

### Steps to obtaining Landfill Usage Permits

*Step 1.* Prime contractors review solid waste regulations for Fort Bragg Landfill Users available:

- on CD in the Solid Waste Office (building 3-1137)
  - CD will auto-run
- via web at [www.bragg.army.mil/envbr/solidwaste.aspx](http://www.bragg.army.mil/envbr/solidwaste.aspx)
  - Scroll down and select Solid Waste Training for Landfill Users
  - Select "read only" when prompted for a password
  - It is a large file and will take a moment to download

*Step 2.* Print and sign Certificate of Completion.

*Step 3.* Complete Landfill Usage Permit Application (LUPA)

*Step 4.* Deliver, send, or fax completed LUPA to government representative for signature.

*Step 5.* Deliver, send, or fax Certificate of Completion and completed LUPA to Solid Waste Office for processing.

*Step 6.* Pick-up or request fax of processed Landfill Usage Permit (LUP) with assigned Landfill Usage Code (LUC).

*Step 7.* Distribute Permit and assigned LUC's to assigned vehicles.

*Step 8.* Ensure sub-contractors receive training CD's or visit web-based training.

IMSE-BRG-PWE-C

14 FEB, 2006

**FORT BRAGG ASBESTOS REMOVAL, TRANSPORTATION, AND  
DISPOSAL DOCUMENTATION FORM**

1. **REMOVAL:** ON \_\_\_\_\_ (DATE) (SF/LF/CF/CY/Bags/LBS) (Circle) OF  
(FRIABLE/NON-FRIABLE) (Circle) ASBESTOS CONTAINING MATERIAL (ACM) REMOVED FROM  
(BUILDING) \_\_\_\_\_, \_\_\_\_\_ (STREET ADDRESS),  
FORT BRAGG, NC, PER \_\_\_\_\_ (WORK ORDER/CONTRACT #)  
WAS PREPARED FOR MOVEMENT TO THE LANDFILL:  
UNDER THE SUPERVISION OF \_\_\_\_\_ (PRINT NAME)  
REPRESENTING \_\_\_\_\_ (FIRM/ORGANIZATION)  
\_\_\_\_\_  
(SIGNATURE OF SUPERVISOR)

2. **TRANSPORTATION:** ON \_\_\_\_\_ (DATE) THE ASBESTOS  
CONTAINING MATERIAL MENTIONED ABOVE WAS TRANSPORTED ON THE VEHICLE  
\_\_\_\_\_  
(LICENSE PLATE NUMBER)  
\_\_\_\_\_  
(SIGNATURE OF DRIVER)  
TO THE CONSTRUCTION & DEMOLITION LANDFILL ON LAMONT ROAD, FORT BRAGG, NC.

3. **DISPOSAL:** THE ACM DESCRIBED IN PARAGRAPH 1 WAS DELIVERED BY THE VEHICLE  
IDENTIFIED ABOVE TO THE CONSTRUCTION & DEMOLITION LANDFILL  
\_\_\_\_\_  
(SIGNATURE/DATE, SCALE HOUSE PERSONNEL)

I (Landfill Operator/Manager) CERTIFY THAT THE LANDFILL HAS BEEN APPROVED FOR  
THE DISPOSAL OF ASBESTOS. THE MATERIAL DELIVERED WAS COVERED PER THE REQUIRED  
LAWS/REGULATIONS WITH THE REQUIRED MATERIAL IN THE PRESCRIBED MANNER.

\_\_\_\_\_  
(SIGNATURE/DATE)

Asbestos Manager - 907-3645  
Scale House - 432-0265  
Landfill Manager - 396-6873  
Solid Waste Manager - 396-3372

Monday, January 31, 2011



Replace Bridge T8512 Camp Mackall  
Fort Bragg, NC

W912HN-07-R-0084

Public Works Business Center

**BORROW PIT PERMIT**

Project  
Title/Description:  
Contract Number:

Contractor Point

Of Contact:

Phone Number:

Contracting

Agency:

Government

Inspector Name:

Phone Number:

## Authorization for Use of Fort Bragg Borrow Pits

1. Your organization is authorized to remove up to the amount of material indicated from the Fort Bragg borrow pit listed below in support of the above project:

	CUBIC YARDS	START DATE	END DATE
BORROW PIT	LOCATION	TRAINING AREA	GRID COORDINATES
Lamont	Lamont Road	K	PJ 755 905

2. This permit is subject to the following conditions:
  - a. Limit borrow operations to the area listed above. Do not expand the boundary of the pit.
  - b. Re-grade any areas worked so that water will not stand in the pit.
  - c. Do not excavate trenches.
  - d. Slopes cut at the edge of the areas worked will not exceed 3:1.
  - e. Do not exceed amount of material authorized above. Requestor must apply for an amended permit to increase the amount.
  - f. Maintain a copy of this permit at the work site. Be prepared to present it on demand to environmental compliance inspectors, Public Works employees, or law enforcement personnel.
  - g. This permit does not guarantee exclusive right to work a specific borrow area within the pit. Coordination and cooperation with other contractors is required while at the borrow pit. It may be necessary to move excavation operations to different areas of the pit to accommodate other users.
  - h. Permits are valid only for 60 days from the issue date below.
  - i. Contact the Engineering Equipment Section at 396-7156 prior to starting excavation operations.
3. Points of contact are Rick Akers 910-396-7156 (DPW Engineering Equipment Section) or Dan Messier 910-396-6873 (DPW Landfill and Borrow Pit)

Permit Issued By: \_\_\_\_\_ Date Issued: \_\_\_\_\_  
Dan Messier, Fort Bragg Borrow Pit Manager

Monday, January 31, 2011



## **APPENDIX EE**

### **HVAC Controls**

UNIT HEATER AND CABINET UNIT HEATER

NODE: <DDC##>  
NODE LOCATION: <\_\_>  
NODE ADDRESS: Domain = <\_\_>, Subnet = <\_\_>, Node = <\_\_>  
NODE ID: <\_\_>

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE
PROOFS & SAFETIES	<__>	<UNIT MANUFACTURER'S PROOF> (SEE NOTES)	<__>	ALM/NORMAL		<BI>
	<__>	<UNIT MANUFACTURER'S SAFETIES> (SEE NOTES)	<__>	ALM/NORMAL		<BI>
START/STOP	SYS-OCC	OCCUPANCY INPUT (FROM SYSTEM SCHEDULER)	~	OCC/UNOCC		NVI
	ZN-OCC	ZONE OCCUPANCY INPUT (OCCUPANCY SENSOR)	~	OCC/UNOCC		BI
	EFF-OCC	EFFECTIVE OCCUPANCY	~	OCC/UNOCC		NVO
	OFF / AUTO	UNIT OFF / AUTO SWITCH	~	~		BI
	UNIT STATUS	UNIT STATUS (SEE NOTES)	~	HVAC_HEAT/ HVAC_OFF		NVO
ZONE TEMPERATURE CONTROL	ZN-T	ZONE TEMPERATURE **	~	<__>		AI
	ZN-T-SP	ZONE TEMPERATURE SETPOINT	OCCUPANT ADJUSTABLE	[68-77 DEG F]		AI
	ZN-T-SP-UNOCC	ZONE TEMPERATURE SETPOINT FOR UNOCCUPIED MODE	[ 82 DEG F ]	~		~
	HTG-V-C	HEATING VALVE COMMAND	~	0-100% OPEN		AO
	SF-SS	SUPPLY FAN START/STOP	~	[OFF/LO/MED/HI]		BO
		HEATING VALVE PID LOOP SETTINGS	<__>	~		~

LDP AND M&C DISPLAY				
LDP VIEW REQ'D	M&C		SNVT NAME	SNVT TYPE
	DISP REQ'D	TREND REQ'D		
~	~	~	~	~
~	~	~	~	~
[ ~ ]	X	[ ~ ]	<__>	<__>
[ ~ ]	[ ~ ]	[ ~ ]	<__>	<__>
[ ~ ]	X	[ ~ ]	<__>	OCCUPANCY
~	[ ~ ]	[ ~ ]	<__>	<__>
[ ~ ]	[ X ]	[ ~ ]	<__>	HVAC_STATUS
[ ~ ]	X	X	<__>	TEMP_P
[ ~ ]	X	[ ~ ]	<__>	<__>
[ ~ ]	[ ~ ]	[ ~ ]	<__>	<__>
[ ~ ]	X	X	<__>	<__>
[ ~ ]	X	[ ~ ]	<__>	<__>
~	~	~	~	~

OVERRIDES			
LDP OVRD REQ'D	M&C OVRD REQ'D	SNVT NAME	SNVT TYPE
~	~	~	~
~	~	~	~
SEE NOTES			
~	~	~	~
~	~	~	~
~	[ ~ ]	<__>	<__>
~	~	~	~
~	~	~	~
[ ~ ]	X	<__>	<__>
[ ~ ]	[ ~ ]	<__>	<__>
~	X	~	~
~	~	~	~
~	~	~	~

ALARMS			
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING NAME	BLDG ROUTING REQ'D
~		[ ]	[ ~ ]
ALM		[ ]	[ ~ ]
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
** ZN-T MORE THAN 77 DEG F OR BELOW 68 DEG F		[ ]	[ ~ ]
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~

- Notes:
- 1) THE CONTRACTOR SHALL COMPLETE THE POINTS SCHEDULE AS SPECIFIED AND AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS DRAWING.
  - 2) UNIT MANUFACTURERS PROOFS AND SAFETIES: THE CONTRACTOR SHALL SHOW EACH PROOF AND SAFETY AS A SEPARATE ROW.
  - 3) SYS-OCC: AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS, OVERRIDE OF SYS-OCC IS ACCOMPLISHED THROUGH THE SYSTEM SCHEDULER.
  - 4) ALARM CONDITIONS MARKED WITH A DOUBLE ASTERISK (\*\*) SHALL BE ACTIVE ONLY WHEN THE SYSTEM IS IN OCCUPIED MODE AND HAS BEEN IN OCCUPIED MODE FOR MORE THAN 30 MINUTES.
  - 5) UNIT STATUS: SERVES AS A MONITORED POINT AT THE M&C SOFTWARE (FRONT-END) AND AS A HEATING/COOLING REQUEST TO THE BOILER, HEAT EXCHANGER, AND/OR CHILLER SERVING THIS SYSTEM.

GAS-FIRED INFRARED HEATER

NODE: <DDC##>  
NODE LOCATION: <\_\_\_>  
NODE ADDRESS: Domain = <\_\_\_>, Subnet = <\_\_\_>, Node = <\_\_\_>  
NODE ID: <\_\_\_>

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE
PROOFS & SAFETIES	<___>	<UNIT MANUFACTURER'S PROOF> (SEE NOTES)	<___>	ALM/NORMAL		<BI>
	<___>	<UNIT MANUFACTURER'S SAFETIES> (SEE NOTES)	<___>	ALM/NORMAL		<BI>
	ZN-OCC	ZONE OCCUPANCY INPUT (OCCUPANCY SENSOR)	~	OCC/UNOCC		BI
	EFF-OCC	EFFECTIVE OCCUPANCY	~	OCC/UNOCC		NVO
	ON / OFF / AUTO	UNIT OFF / AUTO SWITCH	~	~		BI
ZONE TEMPERATURE CONTROL	ZN-T	ZONE TEMPERATURE **	~	<___>		AI
	ZN-T-SP	ZONE TEMPERATURE SETPOINT	OCCUPANT ADJUSTABLE	[68-77 DEG F]		AI
	ZN-T-SP-UNOCC	ZONE TEMPERATURE SETPOINT FOR UNOCCUPIED MODE	[ 82 DEG F ]	~		~
	HTG-IR-2P	INFRARED HEATER ON/OFF COMMAND	~	ON/OFF		BO

LDP AND M&C DISPLAY				
LDP VIEW REQ'D	M&C		SNVT NAME	SNVT TYPE
	DISP REQ'D	TREND REQ'D		
~	~	~	~	~
~	~	~	~	~
[ ~ ]	[ ~ ]	[ ~ ]	<__>	<__>
[ ~ ]	X	[ ~ ]	<__>	OCCUPANCY
~	[ ~ ]	[ ~ ]	<__>	<__>
[ ~ ]	X	X	<__>	TEMP_P
[ ~ ]	X	[ ~ ]	<__>	<__>
[ ~ ]	[ ~ ]	[ ~ ]	<__>	<__>
[ ~ ]	X	[ ~ ]	<__>	<__>

OVERRIDES			
LDP OVRD REQ'D	M&C OVRD REQ'D	SNVT	SNVT
		NAME	TYPE
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	[ ~ ]	< ___ >	< ___ >
~	~	~	~
[ ~ ]	X	< ___ >	< ___ >
[ ~ ]	[ ~ ]	< ___ >	< ___ >
[ ~ ]	X	< ___ >	< ___ >

ALARMS			
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING NAME	BLDG ROUTING REQ'D
~		[ ]	[ ~ ]
ALM		[ ]	[ ~ ]
~		~	~
~		~	~
~		~	~
** ZN-T MORE THAN 77 DEG F OR BELOW 68 DEG F		[ ]	[ ~ ]
~		~	~
~		~	~
~		~	~

- Notes:
- 1) THE CONTRACTOR SHALL COMPLETE THE POINTS SCHEDULE AS SPECIFIED AND AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS DRAWING.
  - 2) UNIT MANUFACTURERS PROOFS AND SAFETIES: THE CONTRACTOR SHALL SHOW EACH PROOF AND SAFETY AS A SEPARATE ROW.
  - 3) SYS-OCC: AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS, OVERRIDE OF SYS-OCC IS ACCOMPLISHED THROUGH THE SYSTEM SCHEDULER.
  - 4) ALARM CONDITIONS MARKED WITH A DOUBLE ASTERISK (\*\*) SHALL BE ACTIVE ONLY WHEN THE SYSTEM IS IN OCCUPIED MODE AND HAS BEEN IN OCCUPIED MODE FOR MORE THAN 30 MINUTES.
  - 5) UNIT STATUS: SERVES AS A MONITORED POINT AT THE M&C SOFTWARE (FRONT-END) AND AS A HEATING/COOLING REQUEST TO THE BOILER, HEAT EXCHANGER, AND/OR CHILLER SERVING THIS SYSTEM.

PERIMETER RADIATION

NODE: <DDC##>  
NODE LOCATION: <\_\_\_>  
NODE ADDRESS: Domain = <\_\_\_>, Subnet = <\_\_\_>, Node = <\_\_\_>  
NODE ID: <\_\_\_>

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE
PROOFS & SAFETIES	<___>	<UNIT MANUFACTURER'S PROOF> (SEE NOTES)	<___>	ALM/NORMAL		<BI>
	<___>	<UNIT MANUFACTURER'S SAFETIES> (SEE NOTES>	<___>	ALM/NORMAL		<BI>
START/STOP	SYS-OCC	OCCUPANCY INPUT (FROM SYSTEM SCHEDULER)	~	OCC/UNOCC		NVI
	ZN-OCC	ZONE OCCUPANCY INPUT (OCCUPANCY SENSOR)	~	OCC/UNOCC		BI
	EFF-OCC	EFFECTIVE OCCUPANCY	~	OCC/UNOCC		NVO
	UNIT STATUS	UNIT STATUS (SEE NOTES)	~	HVAC_HEAT/ HVAC_OFF		NVO
ZONE TEMPERATURE CONTROL	ZN-T	ZONE TEMPERATURE **	~	<___>		AI
	ZN-T-SP	ZONE TEMPERATURE SETPOINT	OCCUPANT ADJUSTABLE	[68-77 DEG F]		AI
	ZN-T-SP-UNOCC	ZONE TEMPERATURE SETPOINT FOR UNOCCUPIED MODE	[ 82 DEG F ]	~		~
	HTG-V-C	HEATING VALVE COMMAND	~	<0-100% OPEN>		AO
		HEATING VALVE PID LOOP SETTINGS	<___>	~		~

LDP AND M&C DISPLAY				
LDP VIEW REQ'D	M&C		SNVT NAME	SNVT TYPE
	DISP REQ'D	TREND REQ'D		
~	~	~	~	~
~	~	~	~	~
[ ~ ]	X	[ ~ ]	<___>	<___>
[ ~ ]	[ ~ ]	[ ~ ]	<___>	<___>
[ ~ ]	X	[ ~ ]	<___>	OCCUPANCY
[ ~ ]	[ X ]	[ ~ ]	<___>	HVAC_STATUS
[ ~ ]	X	X	<___>	TEMP_P
[ ~ ]	X	[ ~ ]	<___>	<___>
[ ~ ]	[ ~ ]	[ ~ ]	<___>	<___>
[ ~ ]	X	X	<___>	<___>
~	~	~	~	~

OVERRIDES			
LDP OVRD REQ'D	M&C OVRD REQ'D	SNVT NAME	SNVT TYPE
~	~	~	~
~	~	~	~
SEE NOTES			
~	~	~	~
[ ~ ]	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
[ ~ ]	X	<___>	<___>
[ ~ ]	[ ~ ]	<___>	<___>
[ ~ ]	~	~	~
~	~	~	~

ALARMS			
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING NAME	BLDG ROUTING REQ'D
~		[ ]	[ ~ ]
ALM		[ ]	[ ~ ]
~		~	~
~		~	~
~		~	~
~		~	~
** ZN-T MORE THAN 77 DEG F OR BELOW 68 DEG F		[ ]	[ ~ ]
~		~	~
~		~	~
~		~	~
~		~	~

- Notes:
- 1) THE CONTRACTOR SHALL COMPLETE THE POINTS SCHEDULE AS SPECIFIED AND AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS DRAWING.
  - 2) UNIT MANUFACTURERS PROOFS AND SAFETIES: THE CONTRACTOR SHALL SHOW EACH PROOF AND SAFETY AS A SEPARATE ROW.
  - 3) SYS-OCC: AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS, OVERRIDE OF SYS-OCC IS ACCOMPLISHED THROUGH THE SYSTEM SCHEDULER.
  - 4) ALARM CONDITIONS MARKED WITH A DOUBLE ASTERISK (\*\*) SHALL BE ACTIVE ONLY WHEN THE SYSTEM IS IN OCCUPIED MODE AND HAS BEEN IN OCCUPIED MODE FOR MORE THAN 30 MINUTES.
  - 5) UNIT STATUS: SERVES AS A MONITORED POINT AT THE M&C SOFTWARE (FRONT-END) AND AS A HEATING/COOLING REQUEST TO THE BOILER, HEAT EXCHANGER, AND/OR CHILLER SERVING THIS SYSTEM.

ALL AIR SMALL PACKAGE UNITARY SYSTEM

NODE: <DDC##>  
NODE LOCATION: <\_\_\_>  
NODE ADDRESS: Domain = <\_\_\_>, Subnet = <\_\_\_>, Node = <\_\_\_>  
NODE ID: <\_\_\_>

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE
PROOFS & SAFETIES		<UNIT MANUFACTURER'S SAFETIES> (SEE NOTES)	<___>	ALM/NORMAL		<BI>
	RST-BUT	SYSTEM RESET BUTTON	~	~		[__]
START/STOP	<___>	HEAT-OFF-COOL SWITCH INPUT	~	HEAT/OFF/COOL/ <EMERG>		<___>
	SYS-OCC	OCCUPANCY INPUT (FROM SYSTEM SCHEDULER)	~	<___>		NVI
	ZN-OCC	ZONE OCCUPANCY INPUT (OCCUPANCY SENSOR)	~	OCC/UNOCC		BI
	SF-ON/AUTO	SUPPLY FAN ON/AUTO SWITCH	~	ON/AUTO		BI
	UNIT STATUS	UNIT STATUS (SEE NOTES)	~	HVAC_COOL/ HVAC_HEAT/ HVAC_OFF		NVO
ZONE TEMPERATURE CONTROL	ZN-T	ZONE TEMPERATURE	~	<___>		AI
	ZN-T-SP	ZONE TEMPERATURE SETPOINT	OCCUPANT ADJUSTABLE	[68-77 DEG F]		AI
	ZN-T-SP-UNOCC	ZONE TEMPERATURE SETPOINT FOR UNOCC MODE				
	SF-SS	SUPPLY FAN START/STOP COMMAND	~	ON/OFF		BO
	COMP-CLG/HTG	COMPRESSOR (PKG UNIT) COOLING/HEATING MODE	~	CLG/HTG		BO
	COMP-SS	COMPRESSOR (PKG UNIT) START/STOP	~	ON/OFF		BO
	EMERG-HTG-2P	EMERG HEATING COMMAND (2-POS)	~	ON/OFF		AO
		HEATING COIL VALVE PID LOOP SETTINGS	<___>	~		~
		COOLING COIL VALVE PID LOOP SETTINGS	<___>	~		~

LDP AND M&C DISPLAY				
LDP VIEW REQ'D	M&C		SNVT NAME	SNVT TYPE
	DISP REQ'D	TREND REQ'D		
[~]	[~]	[~]	<___>	<___>
[~]	[~]	[~]	<___>	<___>
[~]	[~]	[~]	<___>	<___>
[~]	[~]	[~]	<___>	<___>
[~]	[~]	[~]	<___>	<___>
[~]	[~]	[~]	<___>	<___>
[~]	[X]	[~]	<___>	HVAC_STATUS
[~]	X	X	<___>	TEMP_P
[~]	X	X	<___>	<___>
[~]	[~]	[~]	<___>	<___>
[~]	[~]	[~]	<___>	<___>
[~]	[~]	[~]	<___>	<___>
[~]	[~]	[~]	<___>	<___>
[~]	[~]	[~]	<___>	<___>
~	~	~	~	~
~	~	~	~	~

OVERRIDES			
LDP OVRD REQ'D	M&C OVRD REQ'D	SNVT NAME	SNVT TYPE
~	~	~	~
[__]	[__]	<___>	<___>
[~]	[~]	<___>	<___>
SEE NOTES			
~	~	~	~
~	[~]	<___>	<___>
~	~	~	~
~	~	~	~
[~]	X	<___>	<___>
[~]	X	<___>	<___>
[~]	X	<___>	<___>
[~]	X	<___>	<___>
[~]	X	<___>	<___>
~	~	~	~
~	~	~	~

ALARMS			
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING NAME	BLDG ROUTING REQ'D
ALM		[__]	[~]
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
** ZN-T MORE THAN 77 DEG F OR BELOW 68 DEG F		[__]	[~]
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~

- Notes:
- 1) THE CONTRACTOR SHALL COMPLETE THE POINTS SCHEDULE AS SPECIFIED AND AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS DRAWING.
  - 2) UNIT MANUFACTURERS PROOFS AND SAFETIES: THE CONTRACTOR SHALL SHOW EACH PROOF AND SAFETY AS A SEPARATE ROW.
  - 3) SYS-OCC: AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS, OVERRIDE OF SYS-OCC IS ACCOMPLISHED THROUGH THE SYSTEM SCHEDULER.
  - 4) ALARM CONDITIONS MARKED WITH AN ASTERISK (\*) SHALL BE ACTIVE ONLY WHEN THE SYSTEM IS IN OCCUPIED MODE AND HAS BEEN IN OCCUPIED MODE FOR MORE THAN: \* = 5 MINUTES \*\* = 30 MINUTES
  - 5) UNIT STATUS: SERVES AS A MONITORED POINT AT THE M&C SOFTWARE (FRONT-END) AND AS A HEATING/COOLING REQUEST TO THE BOILER, HEAT EXCHANGER, AND/OR CHILLER SERVING THIS SYSTEM.

**NODE: <DDC##>**

**NODE LOCATION:** <\_\_>

**NODE ADDRESS:** Domain = <\_\_\_>, Subnet = <\_\_\_>, Node = <\_\_\_>

**NODE ID:** < >

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE
PROOFS & SAFETIES	HTG-DA-T-LL	HEATING COIL DISCHARGE TEMPERATURE LOW LIMIT SWITCH	[39 DEG F]	ALM/NORMAL		BI
	SA-SMK	SUPPLY AIR SMOKE	~	ALM/NORMAL		BI
	RA-SMK	RETURN AIR SMOKE	~	ALM/NORMAL		BI
	RST-BUT	SYSTEM RESET BUTTON (FOR SAFETIES)	~	~		[ ]
	SF-S	SUPPLY FAN STATUS		ON/OFF		BI
START/STOP	BLDG-T	BUILDING TEMPERATURE (NIGHT STAT)	~	< >		AI
	BLDG-T-LL	BUILDING TEMPERATURE LOW LIMIT SETPOINT	[55 DEG F]	~		~
	SYS-OCC	OCCUPANCY INPUT (FROM SYSTEM SCHEDULER)	~	< >		NVI
	SF-SS	SUPPLY FAN START/STOP	~	ON/OFF		BO
	UNIT STATUS	UNIT STATUS (HTG AND/OR CLG REQUEST) (SEE NOTE)	~	HVAC_HEAT/ HVAC_OFF		NVO
ZONE TEMPERATURE CONTROL	ZN-T	ZONE TEMPERATURE	~	< _ >		AI
	ZN-T-SP	ZONE TEMPERATURE SETPOINT	[OCC ADJ]	[68-77 DEG F]		AI
	HTG-V-C	HEATING COIL VALVE COMMAND	~	0-100% OPEN		AO
	OA-D-C	OUTSIDE AIR DAMPER COMMAND	~	<0-100% OPEN>		AO
	OA-D-MIN	OUTSIDE AIR DAMPER MINIMUM POSITION	[ CFM]	~		~
		HEATING COIL VALVE PID LOOP SETTINGS	< >	~		~
		OUTSIDE AIR DAMPER PID LOOP SETTINGS	< >	~		~
OTHER POINTS	SA-T	SUPPLY AIR TEMPERATURE	~	< >		AI
	MA-FLT-P-HL	MIXED AIR FILTER PRESSURE HIGH LIMIT SWITCH	< >	ALM/NORMAL		BI

SNVT AND M&C DISPLAY				
LDP VIEW REQ'D	M&C		SNVT NAME	SNVT TYPE
	DISP REQ'D	TREND REQ'D		
~	~	~	~	~
~	~	~	~	~
~	~	~	~	~
~	~	~	~	~
[X]	X	[~]	< >	< >
[~]	X	[~]	< >	TEMP_P
[~]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
[~]	[X]	[~]	<__>	HVAC_STATUS
[X]	X	X	<__>	TEMP_P
[X]	X	X	< >	< >
[X]	X	[X]	< >	< >
[X]	X	[X]	< >	< >
~	~	~	~	~
~	~	~	~	~
~	~	~	~	~
[~]	X	[~]	< >	< >
[~]	[~]	~	< >	< >

OVERRIDES			
LDP OVRD REQ'D	M&C OVRD REQ'D	SNVT NAME	SNVT TYPE
~	~	~	~
~	~	~	~
~	~	~	~
~	[ ~ ]	< >	< >
~	~	~	~
~	~	~	~
[ ~ ]	X	< >	< >
SEE NOTES			
[ ~ ]	X	< >	< >
~		~	~
~	~	~	~
[ ~ ]	X	< >	< >
[ ~ ]	X	< >	< >
[ ~ ]	X	< >	< >
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~

ALARMS			
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING NAME	BLDG ROUTING REQ'D
ALM		[ ~ ]	[ ~ ]
ALM		[ ~ ]	[ ~ ]
ALM		[ ~ ]	[ ~ ]
~		~	~
SUPPLY FAN PROOF FAILED		[ ~ ]	[ ~ ]
BLDG-T IS LESS THAN BLDG-T-LL		[ ~ ]	[ ~ ]
~		~	~
~		~	~
~		~	~
~		~	~
** ZN-T IS MORE THAN 37 DEG F ABOVE OR BELOW ZN-T-SP		[ ~ ]	[ ~ ]
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
[ ~ ]		[ ~ ]	[ ~ ]
[ALM]		[ ~ ]	[ ~ ]

Notes:

- 1) THE CONTRACTOR SHALL COMPLETE THE POINTS SCHEDULE AS SPECIFIED AND AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS DRAWING.
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NODE: <DDC##>  
NODE LOCATION: <\_\_>  
NODE ADDRESS: Domain = <\_\_>, Subnet = <\_\_>, Node = <\_\_>  
NODE ID: <\_\_>

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE
PROOFS & SAFETIES	SF-S	SUPPLY FAN STATUS		ON/OFF		BI
	HTG-DA-T-LL	HEATING COIL DISCHARGE TEMPERATURE LOW LIMIT SWITCH	[39 DEG F]	ALM/NORMAL		BI
	SA-SMK	SUPPLY AIR SMOKE	~	ALM/NORMAL		BI
	RA-SMK	RETURN AIR SMOKE	~	ALM/NORMAL		BI
	RST-BUT	SYSTEM RESET BUTTON (FOR SAFETIES)	~	~		< >
START/STOP	BLDG-T	BUILDING TEMPERATURE (NIGHT STAT)	~	< >		AI
	BLDG-T-LL	BUILDING TEMPERATURE LOW LIMIT SETPOINT	[55 DEG F]	~		~
	SYS-OCC	OCCUPANCY INPUT (FROM SYSTEM SCHEDULER)	~	< >		NVI
	SF-SS	SUPPLY FAN START/STOP	~	ON/OFF		BO
	UNIT STATUS	UNIT STATUS (HTG AND/OR CLG REQUEST) (SEE NOTE)	~	HVAC_HEAT/ HVAC_OFF		NVO
MINIMUM OUTSIDE AIRFLOW	MINOA-D-2P	MINIMUM OUTSIDE AIR DAMPER COMMAND (2-POS)	~	OPEN/CLOSED		BO
		MINIMUM OUTSIDE AIR FLOW SETTING	[__ CFM]	~		
ZONE TEMPERATURE CONTROL:  MA DAMPERS  HEATING COIL  DX COIL	OA-T	OUTSIDE AIR TEMPERATURE	~	< >		AI
	MA-D-C	MIXED AIR DAMPER COMMAND	~	0-100% OPEN		AO
	ECO-HL-SP	ECONOMIZER HIGH LIMIT SETPOINT	[__]	~		
	ECO-LL-SP	ECONOMIZER LOW LIMIT SETPOINT	[__]	~		
		MIXED AIR PID LOOP SETTINGS	< >	~		~
	ZN-T	ZONE TEMPERATURE	~	<__>		AI
	ZN-T-SP	ZONE TEMPERATURE SETPOINT	[OCC ADJ]	[68-77 DEG F]		AI
	HTG-V-C	HEATING COIL VALVE COMMAND	~	0-100% OPEN		AO
	DX-V-C	DX UNIT COMMAND	~	< >		< >
		HEATING COIL VALVE PID LOOP SETTINGS	< >	~		~
		DX UNIT PID LOOP SETTINGS	< >	~		~
OTHER POINTS	SA-T	SUPPLY AIR TEMPERATURE	~	< >		AI
	MA-FLT-P-HL	MIXED AIR FILTER PRESSURE HIGH LIMIT SWITCH	< >	ALM/NORMAL		BI

LDP VIEW REQ'D	M&C		SNVT NAME	SNVT TYPE
	DISP REQ'D	TREND REQ'D		
[X]	X	[~]	< >	< >
~	~	~	~	~
~	~	~	~	~
~	~	~	~	~
~	~	~	~	~
~	~	~	~	~
[~]	X	[~]	< >	TEMP_P
[~]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
[~]	[X]	[~]	<__>	HVAC_STATUS
[~]	X	[~]	< >	< >
~	~	~	~	~
[X]	X	[~]	< >	TEMP_P
[X]	X	[X]	< >	< >
[X]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
~	~	~	~	~
[X]	X	X	<__>	TEMP_P
[X]	X	[~]	< >	< >
[X]	X	[X]	< >	< >
[X]	X	[X]	< >	< >
~	~	~	~	~
~	~	~	~	~
[~]	X	[~]	< >	TEMP_P
[~]	[~]	~	< >	< >

LDP OVRD REQ'D	OVERRIDES		
	M&C OVRD REQ'D	SNVT NAME	SNVT TYPE
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	[__]	< >	< >
~	~	~	~
[~]	X	< >	< >
~	X	< >	< >
[~]	X	< >	< >
~	~	~	~
[~]	X	< >	< >
~	~	~	~
~	~	~	~
[~]	X	< >	< >
[~]	X	< >	< >
[~]	X	< >	< >
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~

ALARMS			
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING NAME	BLDG ROUTING REQ'D
SUPPLY FAN PROOF FAILED		[__]	[~]
ALM		[__]	[~]
ALM		[__]	[~]
ALM		[__]	[~]
~		~	~
BLDG-T IS LESS THAN BLDG-T-LL		[__]	[~]
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
[~]		[__]	[~]
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
** ZN-T IS MORE THAN 37 DEG F ABOVE OR BELOW ZN-T-SP		[__]	[~]
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
[~]		[~]	[~]
[ALM]		[__]	[~]

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  - 3) SYS-OCC: AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS, OVERRIDE OF SYS-OCC IS ACCOMPLISHED THROUGH THE SYSTEM SCHEDULER.
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NODE: <DDC##>  
NODE LOCATION: <\_\_>  
NODE ADDRESS: Domain = <\_\_>, Subnet = <\_\_>, Node = <\_\_>  
NODE ID: <\_\_>

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE
PROOFS & SAFETIES	SF-S	SUPPLY FAN STATUS	~	ON/OFF		BI
	HTG-DA-T-LL	HEATING COIL DISCHARGE TEMPERATURE LOW LIMIT SWITC	[39 DEG F]	ALM/NORMAL		BI
	SA-SMK	SUPPLY AIR SMOKE	~	ALM/NORMAL		BI
	RA-SMK	RETURN AIR SMOKE	~	ALM/NORMAL		BI
	RST-BUT	SYSTEM RESET BUTTON (FOR SAFETIES)	~	~		< >
START/STOP	BLDG-T	BUILDING TEMPERATURE (NIGHT STAT)	~	< >		AI
	BLDG-T-LL	BUILDING TEMPERATURE LOW LIMIT SETPOINT	[55 DEG F]	~		~
	SYS-OCC	OCCUPANCY INPUT (FROM SYSTEM SCHEDULER)	~	< >		NVI
	SF-SS	SUPPLY FAN START/STOP	~	ON/OFF		BO
	UNIT STATUS	UNIT STATUS (HTG AND/OR CLG REQUEST) (SEE NOTE)	~	HVAC_COOL/ HVAC_HEAT/ HVAC_OFF		NVO
MINIMUM OUTSIDE AIRFLOW	MINOA-D-2P	MINIMUM OUTSIDE AIR DAMPER COMMAND (2-POS)	~	OPEN/CLOSED		BO
		MINIMUM OUTSIDE AIR FLOW SETTING	[__ CFM]	~		
ZONE TEMPERATURE CONTROL:  MA DAMPERS  HEATING COIL  COOLING COIL	OA-T	OUTSIDE AIR TEMPERATURE	~	< >		AI
	MA-D-C	MIXED AIR DAMPER COMMAND	~	0-100% OPEN		AO
	ECO-HL-SP	ECONOMIZER HIGH LIMIT SETPOINT	[__]	~		
	ECO-LL-SP	ECONOMIZER LOW LIMIT SETPOINT	[__]	~		
		MIXED AIR PID LOOP SETTINGS	< >	~		~
	ZN-T	ZONE TEMPERATURE	~	<__>		AI
	ZN-T-SP	ZONE TEMPERATURE SETPOINT	[OCC ADJ]	[68-77 DEG F]		AI
	HTG-V-C	HEATING COIL VALVE COMMAND	~	0-100% OPEN		AO
	CLG-V-C	COOLING COIL VALVE COMMAND	~	0-100% OPEN		AO
OTHER POINTS		HEATING COIL VALVE PID LOOP SETTINGS	< >	~		~
		COOLING COIL VALVE PID LOOP SETTINGS	< >	~		~
OTHER POINTS	SA-T	SUPPLY AIR TEMPERATURE	~	< >		AI
	MA-FLT-P-HL	MIXED AIR FILTER PRESSURE HIGH LIMIT SWITCH	< >	ALM/NORMAL		BI

LDP VIEW REQ'D	M&C		SNVT NAME	SNVT TYPE
	DISP REQ'D	TREND REQ'D		
[X]	X	[~]	< >	< >
~	~	~	~	~
~	~	~	~	~
~	~	~	~	~
~	~	~	~	~
~	~	~	~	~
[~]	X	[~]	< >	TEMP_P
[~]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
[~]	[X]	[~]	<__>	HVAC_STATUS
[~]	X	[~]	< >	< >
~	~	~	~	~
[X]	X	[~]	< >	TEMP_P
[X]	X	[X]	< >	< >
[X]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
~	~	~	~	~
[X]	X	X	<__>	TEMP_P
[X]	X	[~]	< >	< >
[X]	X	[X]	< >	< >
[X]	X	[X]	< >	< >
~	~	~	~	~
~	~	~	~	~
[~]	X	[~]	< >	TEMP_P
[~]	[~]	~	< >	< >

LDP OVRD REQ'D	M&C OVRD REQ'D	OVERRIDES	
		SNVT NAME	SNVT TYPE
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	[__]	< >	< >
~	~	~	~
[~]	X	< >	< >
~	X	< >	< >
~	~	~	~
[~]	X	< >	< >
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~

ALARMS			
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING NAME	BLDG ROUTING REQ'D
SUPPLY FAN PROOF FAILED		[__]	[~]
ALM		[__]	[~]
ALM		[__]	[~]
ALM		[__]	[~]
~		~	~
BLDG-T IS LESS THAN BLDG-T-LL		[__]	[~]
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
[~]		[__]	[~]
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
** ZN-T IS MORE THAN 37 DEG F ABOVE OR BELOW ZN-T-SP		[__]	[~]
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
[~]		[~]	[~]
[ALM]		[__]	[~]

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NODE: <DDC##>  
NODE LOCATION: <\_\_>  
NODE ADDRESS: Domain = <\_\_>, Subnet = <\_\_>, Node = <\_\_>  
NODE ID: <\_\_>

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE
PROOFS & SAFETIES	SF-S	SUPPLY FAN STATUS	~	ON/OFF		BI
	DT-DA-T-LL	DUAL TEMP COIL DISCHARGE AIR TEMP LOW LIMIT SWITCH	[39 DEG F]	ALM/NORMAL		BI
	SA-SMK	SUPPLY AIR SMOKE	~	ALM/NORMAL		BI
	RA-SMK	RETURN AIR SMOKE	~	ALM/NORMAL		BI
	RST-BUT	SYSTEM RESET BUTTON (FOR SAFETIES)	~	~		<__>
START/STOP	BLDG-T	BUILDING TEMPERATURE (NIGHT STAT)	~	<__>		AI
	BLDG-T-LL	BUILDING TEMPERATURE LOW LIMIT SETPOINT	[55 DEG F]	~		~
	SYS-OCC	OCCUPANCY INPUT (FROM SYSTEM SCHEDULER)	~	<__>		NVI
	SF-SS	SUPPLY FAN START/STOP	~	ON/OFF		BO
	UNIT STATUS	UNIT STATUS (HTG AND/OR CLG REQUEST) (SEE NOTE)	~	HVAC_COOL/ HVAC_HEAT/ HVAC_OFF		NVO
MINIMUM OUTSIDE AIRFLOW	MINOA-D-2P	MINIMUM OUTSIDE AIR DAMPER COMMAND (2-POS)	~	OPEN/CLOSED		BO
		MINIMUM OUTSIDE AIR FLOW SETTING	[__ CFM]	~		
ZONE TEMPERATURE CONTROL:  MA DAMPERS  HEATING COIL  COOLING COIL	OA-T	OUTSIDE AIR TEMPERATURE	~	<__>		AI
	MA-D-C	MIXED AIR DAMPER COMMAND	~	0-100% OPEN		AO
	ECO-HL-SP	ECONOMIZER HIGH LIMIT SETPOINT	[__]	~		~
	ECO-LL-SP	ECONOMIZER LOW LIMIT SETPOINT	[__]	~		~
		MIXED AIR PID LOOP SETTINGS	<__>	~		~
	DTWS-T	DUAL TEMP WATER SUPPLY TEMPERATURE	~	<__>		AI
	DTWS-T-SP	DUAL TEMP WATER SUPPLY TEMPERATURE SETPOINT	[__]	~		~
	ZN-T	ZONE TEMPERATURE	~	<__>		AI
	ZN-T-SP	ZONE TEMPERATURE SETPOINT	[OCC ADJ]	[68-77 DEG F]		AI
	DT-V-C	DUAL TEMP COIL VALVE COMMAND	~	0-100% OPEN		AO
		DUAL TEMP COIL VALVE COOLING PID LOOP SETTINGS	<__>	~		~
		DUAL TEMP COIL VALVE HEATING PID LOOP SETTINGS	<__>	~		~
OTHER POINTS	SA-T	SUPPLY AIR TEMPERATURE	~	<__>		AI
	MA-FLT-P-HL	MIXED AIR FILTER PRESSURE HIGH LIMIT SWITCH	<__>	ALM/NORMAL		BI

LDP VIEW REQ'D	M&C		SNVT NAME	SNVT TYPE
	DISP REQ'D	TREND REQ'D		
[X]	X	[~]	<__>	<__>
~	~	~	~	~
~	~	~	~	~
~	~	~	~	~
~	~	~	~	~
[~]	X	[~]	<__>	TEMP_P
[~]	X	[~]	<__>	<__>
[X]	X	[~]	<__>	<__>
[X]	X	[~]	<__>	<__>
[~]	[X]	[~]	<__>	HVAC_STATUS
[~]	X	[~]	<__>	<__>
~	~	~	~	~
[X]	X	[~]	<__>	TEMP_P
[X]	X	[X]	<__>	<__>
[X]	X	[~]	<__>	<__>
[X]	X	[~]	<__>	<__>
~	~	~	~	~
[X]	X	[~]	<__>	TEMP_P
[~]	X	[~]	<__>	<__>
[X]	X	X	<__>	TEMP_P
[X]	X	X	<__>	<__>
[X]	X	[X]	<__>	<__>
~	~	~	~	~
~	~	~	~	~
[~]	X	[~]	<__>	TEMP_P
[~]	[~]	~	<__>	<__>

LDP OVRD REQ'D	OVERRIDES		
	M&C OVRD REQ'D	SNVT NAME	SNVT TYPE
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	[__]	<__>	<__>
~	~	~	~
[~]	X	<__>	<__>
SEE NOTES			
[~]	X	<__>	<__>
~	~	~	~
[~]	X	<__>	<__>
~	~	~	~
~	~	~	~
~	~	~	~
[~]	X	<__>	<__>
[~]	X	<__>	<__>
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~

ALARMS			
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING NAME	BLDG ROUTING REQ'D
SUPPLY FAN PROOF FAILED		[__]	[~]
ALM		[__]	[~]
ALM		[__]	[~]
ALM		[__]	[~]
~		~	~
BLDG-T IS LESS THAN BLDG-T-LL		[__]	[~]
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
[~]		[__]	[~]
~		~	~
~		~	~
~		~	~
~		~	~
[~]		[__]	[~]
~		~	~
** ZN-T IS MORE THAN 37 DEG F ABOVE OR BELOW ZN-T-SP		[__]	[~]
~		~	~
~		~	~
~		~	~
~		~	~
[~]		[~]	[~]
[ALM]		[__]	[~]

- Notes:
- 1) THE CONTRACTOR SHALL COMPLETE THE POINTS SCHEDULE AS SPECIFIED AND AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS DRAWING.
  - 2) UNIT MANUFACTURERS PROOFS AND SAFETIES: THE CONTRACTOR SHALL SHOW EACH PROOF AND SAFETY AS A SEPARATE ROW.
  - 3) SYS-OCC: AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS, OVERRIDE OF SYS-OCC IS ACCOMPLISHED THROUGH THE SYSTEM SCHEDULER.
  - 4) ALARM CONDITIONS MARKED WITH AN ASTERISK (\*) SHALL BE ACTIVE ONLY WHEN THE SYSTEM IS IN OCCUPIED MODE AND HAS BEEN IN OCCUPIED MODE FOR MORE THAN: \* = 5 MINUTES \*\* = 30 MINUTES
  - 5) UNIT STATUS: SERVES AS A MONITORED POINT AT THE M&C SOFTWARE (FRONT-END) AND AS A HEATING/COOLING REQUEST TO THE BOILER, HEAT EXCHANGER, AND/OR CHILLER SERVING THIS SYSTEM.

Section: Appendix FF  
SINGLE ZONE WITH HEATING AND COOLING COILS AND RETURN AIR BYPASS

NODE: <DDC##>  
NODE LOCATION: <\_\_>  
NODE ADDRESS: Domain = <\_\_>, Subnet = <\_\_>, Node = <\_\_>  
NODE ID: <\_\_>

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE
PROOFS & SAFETIES	SF-S	SUPPLY FAN STATUS	~	ON/OFF		BI
	HTG-DA-T-LL	HEATING COIL DISCHARGE AIR TEMP LOW LIMIT SWITCH	[39 DEG F]	ALM/NORMAL		BI
	SA-SMK	SUPPLY AIR SMOKE	~	ALM/NORMAL		BI
	RA-SMK	RETURN AIR SMOKE	~	ALM/NORMAL		BI
	RST-BUT	SYSTEM RESET BUTTON (FOR SAFETIES)	~	~		< >
START/STOP	BLDG-T	BUILDING TEMPERATURE (NIGHT STAT)	~	< >		AI
	BLDG-T-LL	BUILDING TEMPERATURE LOW LIMIT SETPOINT	[55 DEG F]	~		~
	SYS-OCC	OCCUPANCY INPUT (FROM SYSTEM SCHEDULER)	~	< >		NVI
	SF-SS	SUPPLY FAN START/STOP	~	ON/OFF		BO
	UNIT STATUS	UNIT STATUS (HTG AND/OR CLG REQUEST) (SEE NOTE)	~	HVAC_COOL/ HVAC_HEAT/ HVAC_OFF		NVO
MINIMUM OUTSIDE AIRFLOW	MINOA-D-2P	MINIMUM OUTSIDE AIR DAMPER COMMAND (2-POS)	~	OPEN/CLOSED		BO
		MINIMUM OUTSIDE AIR FLOW SETTING	[ CFM]	~		
ZONE TEMPERATURE CONTROL:	OA-T	OUTSIDE AIR TEMPERATURE	~	< >		AI
	MA-D-C	MIXED AIR DAMPER COMMAND	~	0-100% OPEN		AO
	ECO-HL-SP	ECONOMIZER HIGH LIMIT SETPOINT	[ ]	~		~
	ECO-LL-SP	ECONOMIZER LOW LIMIT SETPOINT	[ ]	~		~
		MIXED AIR PID LOOP SETTINGS	< >	~		~
MA DAMPERS	ZN-T	ZONE TEMPERATURE	~	<__>		AI
HEATING COIL	ZN-T-SP	ZONE TEMPERATURE SETPOINT	[OCC ADJ]	[68-77 DEG F]		AI
	HTG-V-C	HEATING COIL VALVE COMMAND	~	0-100% OPEN		AO
COOLING COIL	CLG-V-C-2P	COOLING COIL VALVE COMMAND (2-POS)	~	OPEN/CLOSED		BO
	BA-D-C	BYPASS AIR DAMPER COMMAND	~	0-100% OPEN		AO
BYPASS DAMPER		BYPASS AIR DAMPER PID LOOP SETTINGS	< >	~		~
		HEATING COIL VALVE PID LOOP SETTINGS	< >	~		~
OTHER POINTS	SA-T	SUPPLY AIR TEMPERATURE	~	< >		AI
	MA-FLT-P-HL	MIXED AIR FILTER PRESSURE HIGH LIMIT SWITCH	< >	ALM/NORMAL		BI
	BA-FLT-P-HL	BYPASS AIR FILTER PRESSURE HIGH LIMIT SWITCH	< >	ALM/NORMAL		BI

LDP VIEW REQ'D	M&C		SNVT NAME	SNVT TYPE
	DISP REQ'D	TREND REQ'D		
[X]	X	[~]	< >	< >
~	~	~	~	~
~	~	~	~	~
~	~	~	~	~
~	~	~	~	~
~	~	~	~	~
[~]	X	[~]	< >	TEMP_P
[~]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
[~]	[X]	[~]	<__>	HVAC_STATUS
[~]	X	[~]	< >	< >
~	~	~	~	~
[X]	X	[~]	< >	TEMP_P
[X]	X	[X]	< >	< >
[X]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
~	~	~	~	~
X	X	X	<__>	TEMP_P
X	X	X	< >	< >
X	X	[X]	< >	< >
X	X	[X]	< >	< >
X	X	[X]	< >	< >
~	~	~	~	~
~	~	~	~	~
~	~	~	~	~
[~]	X	[~]	< >	TEMP_P
[~]	[~]	~	< >	< >
[~]	[~]	~	< >	< >

LDP OVRD REQ'D	OVERRIDES		
	M&C OVRD REQ'D	SNVT NAME	SNVT TYPE
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	[ ]	< >	< >
~	~	~	~
[~]	X	< >	< >
	SEE NOTES		
[~]	X	< >	< >
~	~	~	~
[~]	X	< >	< >
~	~	~	~
~	~	~	~
[~]	X	< >	< >
[~]	X	< >	< >
[~]	X	< >	< >
[~]	X	< >	< >
[~]	[~]	< >	< >
[~]	[~]	< >	< >
~	~	~	~
~	~	~	~
~	~	~	~

ALARMS			
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING NAME	BLDG ROUTING REQ'D
SUPPLY FAN PROOF FAILED		[ ]	[~]
ALM		[ ]	[~]
ALM		[ ]	[~]
ALM		[ ]	[~]
~		~	~
BLDG-T IS LESS THAN BLDG-T-LL		[ ]	[~]
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
[~]		[ ]	[~]
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
** ZN-T IS MORE THAN 37 DEG F ABOVE OR BELOW ZN-T-SP		[ ]	[~]
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
[~]		[~]	[~]
[ALM]		[ ]	[~]
[ALM]		[ ]	[~]

- Notes:
- 1) THE CONTRACTOR SHALL COMPLETE THE POINTS SCHEDULE AS SPECIFIED AND AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS DRAWING.
  - 2) UNIT MANUFACTURERS PROOFS AND SAFETIES: THE CONTRACTOR SHALL SHOW EACH PROOF AND SAFETY AS A SEPARATE ROW.
  - 3) SYS-OCC: AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS, OVERRIDE OF SYS-OCC IS ACCOMPLISHED THROUGH THE SYSTEM SCHEDULER.
  - 4) ALARM CONDITIONS MARKED WITH AN ASTERISK (\*) SHALL BE ACTIVE ONLY WHEN THE SYSTEM IS IN OCCUPIED MODE AND HAS BEEN IN OCCUPIED MODE FOR MORE THAN: \* = 5 MINUTES \*\* = 30 MINUTES
  - 5) UNIT STATUS: SERVES AS A MONITORED POINT AT THE M&C SOFTWARE (FRONT-END) AND AS A HEATING/COOLING REQUEST TO THE BOILER, HEAT EXCHANGER, AND/OR CHILLER SERVING THIS SYSTEM.

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	INITIAL NAME	IO TYPE
PROOFS & SAFETIES	SF-S	SUPPLY FAN STATUS	~	ON/OFF		BI
	PH-DA-T-LL	PREHEAT COIL DISCHARGE AIR TEMP LOW LIMIT SWITCH	[39 DEG F]	ALM/NORMAL		BI
	SA-SMK	SUPPLY AIR SMOKE	~	ALM/NORMAL		BI
	RA-SMK	RETURN AIR SMOKE	~	ALM/NORMAL		BI
	RST-BUT	SYSTEM RESET BUTTON (FOR SAFETIES)	~	~		< ~ >
START/STOP	BLDG-T	BUILDING TEMPERATURE (NIGHT STAT)	~	< ~ >		AI
	BLDG-T-LL	BUILDING TEMPERATURE LOW LIMIT SETPOINT	[55 DEG F]	~		~
	SYS-OCC	OCCUPANCY INPUT (FROM SYSTEM SCHEDULER)	~	< ~ >		NVI
	SF-SS	SUPPLY FAN START/STOP	~	ON/OFF		BO
	UNIT STATUS	UNIT STATUS (HTG AND/OR CLG REQUEST) (SEE NOTE)	~	HVAC_COOL/ HVAC_HEAT/ HVAC_OFF		NVO
OUTSIDE AIRFLOW	OA-D-2P	OUTSIDE AIR DAMPER COMMAND (2-POS)	~	OPEN/CLOSED		BO
		OUTSIDE AIR FLOW SETTING	[ ~ CFM]	~		
PREHEAT COIL CONTROL	PH-DA-T	PREHEAT COIL DISCHARGE AIR TEMPERATURE	~	< ~ >		AI
	PH-DA-T-SP	PREHEAT COIL DISCHARGE AIR TEMPERATURE SETPOINT	~	< ~ >		AO
	PH-V-C	PREHEAT COIL VALVE COMMAND	~	<0-100% OPEN>		AO
		PREHEAT COIL VALVE PID LOOP SETTINGS	< ~ >	~		~
ZONE TEMPERATURE AND HUMIDITY CONTROL	ZN-T	ZONE TEMPERATURE	~	< ~ >		AI
	ZN-T-SP	ZONE TEMPERATURE SETPOINT	[OCC ADJ]	[68-77 DEG F]		AI
	ZN-RH	ZONE RELATIVE HUMIDITY	~	<0 - 100 % RH>		AI
	ZN-RH-SP	ZONE RELATIVE HUMIDITY SETPOINT	[ ~ ]	~		~
	SA-RH	SUPPLY AIR RELATIVE HUMIDITY	~	<0 - 100 % RH>		AI
	SA-RH-SP	SUPPLY AIR RELATIVE HUMIDITY SETPOINT	80% RH	~		~
	RH-V-C	REHEAT COIL VALVE COMMAND	~	<0-100% OPEN>		AO
	CLG-V-C	COOLING COIL VALVE COMMAND	~	<0-100% OPEN>		AO
	HUM-V-C	HUMIDIFIER VALVE COMMAND	~	<0-100% OPEN>		AO
		COOLING COIL VALVE PID LOOP SETTINGS FOR RH CONTROL	< ~ >	~		~
		COOLING COIL VALVE PID LOOP SETTINGS FOR TEMP CONTR	< ~ >	~		~
		HEATING COIL VALVE PID LOOP SETTINGS	< ~ >	~		~
		HUMIDIFIER VALVE PID LOOP SETTINGS	< ~ >	~		~
OTHER POINTS	SA-T	SUPPLY AIR TEMPERATURE	~	< ~ >		AI
	MA-FLT-P-HL	MIXED AIR FILTER PRESSURE HIGH LIMIT SWITCH	[ ~ ]	ALM/NORMAL		BI
	OA-FLT-P-HL	OUTSIDE AIR FILTER PRESSURE HIGH LIMIT SWITCH	[ ~ ]	ALM/NORMAL		BI

LDP OVRD REQ'D	OVERRIDES		
	M&C OVRD REQ'D	SNVT NAME	SNVT TYPE
~	~	~	~
~	~	~	~
~	~	~	~
[ ~ ]	[ ~ ]	< >	< >
~	~	~	~
[ ~ ]	X	< >	< >
SEE NOTES			
[ ~ ]	[ ~ ]	< >	< >
~	~	~	~
[ ~ ]	X	< >	< >
~	~	~	~
~	~	~	~
[ ~ ]	X	< >	< >
[ ~ ]	X	< >	< >
~	~	~	~
~	~	~	~
[ ~ ]	X	< >	< >
~	~	~	~
[ ~ ]	X	< >	< >
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~

ALARMS			
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING NAME	BLDG ROUTING REQ'D
SUPPLY FAN PROOF FAILED		[ ~ ]	[ ~ ]
ALM		[ ~ ]	[ ~ ]
ALM		[ ~ ]	[ ~ ]
ALM		[ ~ ]	[ ~ ]
~		~	~
BLDG-T IS LESS THAN BLDG-T-LL		[ ~ ]	[ ~ ]
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
PH-DA-T IS MORE THAN 34 DEG F BELOW PH-DA-T-SP			
~		~	~
~		~	~
~		~	~
** ZN-T IS MORE THAN 37 DEG F ABOVE OR BELOW ZN-T-SP		[ ~ ]	[ ~ ]
~		~	~
** ZN-RH IS MORE THAN 10% ABOVE OR BELOW ZN-RH-SP		[ ~ ]	[ ~ ]
~		~	~
SA-RH IS ABOVE 90% RH		[ ~ ]	[ ~ ]
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
[ ~ ]		[ ~ ]	[ ~ ]
[ALM]		[ ~ ]	[ ~ ]
[ALM]		[ ~ ]	[ ~ ]

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FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE
PROOFS & SAFETIES	SF-S	SUPPLY FAN STATUS	~	ON/OFF		BI
	RF-S	RETURN FAN STATUS	~	ON/OFF		BI
	MA-T-LL	MIXED AIR TEMPERATURE LOW LIMIT	[39 DEG F]	ALM/NORMAL		BI
	SA-SMK	SUPPLY AIR SMOKE	~	ALM/NORMAL		BI
	RA-SMK	RETURN AIR SMOKE	~	ALM/NORMAL		BI
	RST-BUT	SYSTEM RESET BUTTON (FOR SAFETIES)	~	~		< >
START/STOP	BLDG-T	BUILDING TEMPERATURE (NIGHT STAT)	~	< >		AI
	BLDG-T-LL	BUILDING TEMPERATURE LOW LIMIT SETPOINT	[55 DEG F]	~		~
	SYS-OCC	OCCUPANCY INPUT (FROM SYSTEM SCHEDULER)	~	< >		NVI
	SF-SS	SUPPLY FAN START/STOP	~	START/STOP		BO
	UNIT STATUS	UNIT STATUS (HTG AND/OR CLG REQUEST) (SEE NOTE)	~	HVAC_COOL/ HVAC_HEAT/ HVAC_OFF		NVO
MINIMUM OUTSIDE AIRFLOW	MINOA-D-2P	MINIMUM OUTSIDE AIR DAMPER COMMAND (2-POS)	~	OPEN/CLOSED		BO
		MINIMUM OUTSIDE AIR FLOW SETTING	[ CFM]	~		~
MIXED AIR TEMPERATURE CONTROL WITH ECONOMIZER	OA-T	OUTSIDE AIR TEMPERATURE	~	< >		AI
	MA-D-C	MIXED AIR DAMPER COMMAND	~	0-100% OPEN		AO
	MA-T	MIXED AIR TEMPERATURE	~	< >		AI
	MA-T-SP	MIXED AIR TEMPERATURE SETPOINT	[ ]	~		~
	ECO-HL-SP	ECONOMIZER HIGH LIMIT SETPOINT	[ ]	~		~
	ECO-LL-SP	ECONOMIZER LOW LIMIT SETPOINT	[ ]	~		~
		MIXED AIR DAMPER PID LOOP SETTINGS	< >	~		~
HOT DECK CONTROL	HD-T	HOT DECK TEMPERATURE	~	< >		AI
	HD-T-SP	HOT DECK TEMPERATURE SETPOINT	[ RESET ]	~		~
	HD-V-C	HOT DECK VALVE COMMAND	~	0-100% OPEN		AO
		HEATING COIL VALVE PID LOOP SETTINGS	< >	~		~
COLD DECK CONTROL	CD-T	COLD DECK TEMPERATURE	~	< >		AI
	CD-T-SP	COLD DECK TEMPERATURE SETPOINT	[ ]	~		~
	CD-V-C	COLD DECK VALVE COMMAND	~	0-100% OPEN		AO
		COOLING COIL VALVE PID LOOP SETTINGS	< >	~		~
ZONE [1] TEMPERATURE CONTROL	ZN-T	ZONE TEMPERATURE	~	< __ >		AI
	ZN-T-SP	ZONE TEMPERATURE SETPOINT	[OCC ADJ]	[68-77 DEG F]		AI
	ZN-D-C	ZONE DAMPER COMMAND	~	0-100% OPEN		AO
		ZONE DAMPER PID LOOP SETTINGS	< >	~		~
ZONE [2] TEMPERATURE CONTROL	ZN-T	ZONE TEMPERATURE	~	< __ >		AI
	ZN-T-SP	ZONE TEMPERATURE SETPOINT	[OCC ADJ]	[68-77 DEG F]		AI
	ZN-D-C	ZONE DAMPER COMMAND	~	0-100% OPEN		AO
		ZONE DAMPER PID LOOP SETTINGS	< >	~		~
OTHER POINTS	RA-T	RETURN AIR TEMPERATURE	~	< >		AI
	MA-FLT-P-HL	MIXED AIR FILTER PRESSURE HIGH LIMIT SWITCH	< >	ALM/NORMAL		BI

OVERRIDES			
LDP OVRD REQ'D	M&C OVRD REQ'D	SNVT	SNVT
		NAME	TYPE
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
[ ~ ]	[ ~ ]	< >	< >
~	~	~	~
[ ~ ]	X	< >	< >
SEE NOTES			
[ ~ ]	[ ~ ]	< >	< >
~	~	~	~
[ ~ ]	X	< >	< >
~	~	~	~
~	~	~	~
[ ~ ]	X	< >	< >
~	~	~	~
~	X	< >	< >
~	X	< >	< >
[ ~ ]	X	< >	< >
~	~	~	~
[ ~ ]	X	< >	< >
[ ~ ]	X	< >	< >
~	~	~	~
~	~	~	~
[ ~ ]	X	< >	< >
[ ~ ]	X	< >	< >
~	~	~	~
~	~	~	~
[ ~ ]	X	< >	< >
[ ~ ]	X	< >	< >
~	~	~	~
~	~	~	~

ALARMS			
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING NAME	BLDG ROUTING REQ'D
SUPPLY FAN PROOF FAILED		[ ]	[~]
SUPPLY FAN PROOF FAILED		[ ]	[~]
ALM		[ ]	[~]
ALM		[ ]	[~]
ALM		[ ]	[~]
~		~	~
BLDG-T IS LESS THAN BLDG-T-LL		[ ]	[~]
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
[~]		[ ]	[~]
~		~	~
[~]		[ ]	[~]
~		~	~
~		~	~
~		~	~
~		~	~
[~]		[ ]	[~]
~		~	~
~		~	~
~		~	~
[~]		[ ]	[~]
~		~	~
~		~	~
~		~	~
** ZN-T IS MORE THAN 37 DEG F ABOVE OR BELOW ZN-T-SP		[ ]	[~]
~		~	~
~		~	~
~	~	~	~
** ZN-T IS MORE THAN 37 DEG F ABOVE OR BELOW ZN-T-SP		[ ]	[~]
~		~	~
~		~	~
~	~	~	~
[~]		[~]	[~]
[ALM]		[ ]	[~]

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FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE
PROOFS & SAFETIES	SF-S	SUPPLY FAN STATUS	~	ON/OFF		BI
	RF-S	RETURN FAN STATUS	~	ON/OFF		BI
	MA-T-LL	MIXED AIR TEMPERATURE LOW LIMIT	[39 DEG F]	ALM/NORMAL		BI
	SA-SMK	SUPPLY AIR SMOKE	~	ALM/NORMAL		BI
	RA-SMK	RETURN AIR SMOKE	~	ALM/NORMAL		BI
	RST-BUT	SYSTEM RESET BUTTON (FOR SAFETIES)	~	~		< >
START/STOP	BLDG-T	BUILDING TEMPERATURE (NIGHT STAT)	~	< >		AI
	BLDG-T-LL	BUILDING TEMPERATURE LOW LIMIT SETPOINT	[55 DEG F]	~		~
	SYS-OCC	OCCUPANCY INPUT (FROM SYSTEM SCHEDULER)	~	< >		NVI
	SF-SS	SUPPLY FAN START/STOP	~	START/STOP		BO
	UNIT STATUS	UNIT STATUS (HTG AND/OR CLG REQUEST) (SEE NOTE)	~	HVAC_COOL/ HVAC_HEAT/ HVAC_OFF		NVO
MINIMUM OUTSIDE AIRFLOW	MINOA-D-2P	MINIMUM OUTSIDE AIR DAMPER COMMAND (2-POS)	~	OPEN/CLOSED		BO
		MINIMUM OUTSIDE AIR FLOW SETTING	[ CFM]	~		~
MIXED AIR TEMPERATURE CONTROL WITH ECONOMIZER	OA-T	OUTSIDE AIR TEMPERATURE	~	< >		AI
	MA-D-C	MIXED AIR DAMPER COMMAND	~	0-100% OPEN		AO
	MA-T	MIXED AIR TEMPERATURE	~	< >		AI
	MA-T-SP	MIXED AIR TEMPERATURE SETPOINT	[ ]	~		~
	ECO-HL-SP	ECONOMIZER HIGH LIMIT SETPOINT	[ ]	~		~
	ECO-LL-SP	ECONOMIZER LOW LIMIT SETPOINT	[ ]	~		~
		MIXED AIR DAMPER PID LOOP SETTINGS	< >	~		~
HOT DECK CONTROL	HD-T	HOT DECK TEMPERATURE	~	< >		AI
	HD-T-SP	HOT DECK TEMPERATURE SETPOINT	[ RESET ]	~		~
	HD-V-C	HOT DECK VALVE COMMAND	~	0-100% OPEN		AO
		HEATING COIL VALVE PID LOOP SETTINGS	< >	~		~
COLD DECK CONTROL	CD-T	COLD DECK TEMPERATURE	~	< >		AI
	CD-T-SP	COLD DECK TEMPERATURE SETPOINT	[ ]	~		~
	CD-V-C	COLD DECK VALVE COMMAND	~	0-100% OPEN		AO
		COOLING COIL VALVE PID LOOP SETTINGS	< >	~		~
ZONE [1] TEMPERATURE CONTROL	ZN-T	ZONE TEMPERATURE	~	<__>		AI
	ZN-T-SP	ZONE TEMPERATURE SETPOINT	[OCC ADJ]	[68-77 DEG F]		AI
	ZN-D-C	ZONE DAMPER COMMAND	~	0-100% OPEN		AO
		ZONE DAMPER PID LOOP SETTINGS	< >	~		~
ZONE [2] TEMPERATURE CONTROL	ZN-T	ZONE TEMPERATURE	~	<__>		AI
	ZN-T-SP	ZONE TEMPERATURE SETPOINT	[OCC ADJ]	[68-77 DEG F]		AI
	ZN-D-C	ZONE DAMPER COMMAND	~	0-100% OPEN		AO
		ZONE DAMPER PID LOOP SETTINGS	< >	~		~
OTHER POINTS	RA-T	RETURN AIR TEMPERATURE	~	< >		AI
	MA-FLT-P-HL	MIXED AIR FILTER PRESSURE HIGH LIMIT SWITCH	< >	ALM/NORMAL		BI

[illegible]

ALARMS			
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING NAME	BLDG ROUTING REQ'D
SUPPLY FAN PROOF FAILED		[ ]	[~]
SUPPLY FAN PROOF FAILED		[ ]	[~]
ALM		[ ]	[~]
ALM		[ ]	[~]
ALM		[ ]	[~]
~		~	~
BLDG-T IS LESS THAN BLDG-T-LL		[ ]	[~]
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
[~]		[ ]	[~]
~		~	~
[~]		[ ]	[~]
~		~	~
~		~	~
~		~	~
~		~	~
[~]		[ ]	[~]
~		~	~
~		~	~
~		~	~
[~]		[ ]	[~]
~		~	~
~		~	~
~		~	~
** ZN-T IS MORE THAN 37 DEG F ABOVE OR BELOW ZN-T-SP		[ ]	[~]
~		~	~
~		~	~
~		~	~
** ZN-T IS MORE THAN 37 DEG F ABOVE OR BELOW ZN-T-SP		[ ]	[~]
~		~	~
~		~	~
~		~	~
[~]		[~]	[~]
[ALM]		[ ]	[~]

Monday, January 31, 2011



FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE
PROOFS & SAFETIES	SF-S	SUPPLY FAN STATUS	~	ON/OFF		BI
	RF-S	RETURN FAN STATUS	~	ON/OFF		BI
	MA-T-LL	MIXED AIR TEMPERATURE LOW LIMIT	[39 DEG F]	ALM/NORMAL		BI
	SA-SMK	SUPPLY AIR SMOKE	~	ALM/NORMAL		BI
	RA-SMK	RETURN AIR SMOKE	~	ALM/NORMAL		BI
	RST-BUT	SYSTEM RESET BUTTON (FOR SAFETIES)	~	~		< >
START/STOP	BLDG-T	BUILDING TEMPERATURE (NIGHT STAT)	~	< >		AI
	BLDG-T-LL	BUILDING TEMPERATURE LOW LIMIT SETPOINT	[55 DEG F]	~		~
	SYS-OCC	OCCUPANCY INPUT (FROM SYSTEM SCHEDULER)	~	< >		NVI
	SF-SS	SUPPLY FAN START/STOP	~	START/STOP		BO
	UNIT STATUS	UNIT STATUS (HTG AND/OR CLG REQUEST) (SEE NOTE)	~	HVAC_COOL/ HVAC_HEAT/ HVAC_OFF		NVO
MINIMUM OUTSIDE AIRFLOW	MINOA-D-2P	MINIMUM OUTSIDE AIR DAMPER COMMAND (2-POS)	~	OPEN/CLOSED		BO
		MINIMUM OUTSIDE AIR FLOW SETTING	[ CFM]	~		~
MIXED AIR TEMPERATURE CONTROL WITH ECONOMIZER	OA-T	OUTSIDE AIR TEMPERATURE	~	< >		AI
	OA-D-C	OUTSIDE AIR DAMPER COMMAND	~	0-100% OPEN		AO
	MA-T	MIXED AIR TEMPERATURE	~	< >		AI
	MA-T-SP	MIXED AIR TEMPERATURE SETPOINT	[ ]	~		~
	ECO-HL-SP	ECONOMIZER HIGH LIMIT SETPOINT	[ ]	~		~
	ECO-LL-SP	ECONOMIZER LOW LIMIT SETPOINT	[ ]	~		~
		MIXED AIR DAMPER PID LOOP SETTINGS	< >	~		~
COLD DECK CONTROL	CLG-DA-T	COOLING COIL DISCHARGE AIR TEMPERATURE	~	< >		AI
	CLG-DA-T-SP	COOLING COIL DISCHARGE AIR TEMPERATURE SETPOINT	[ ]	~		~
	CD-V-C	COLD DECK VALVE COMMAND	~	0-100% OPEN		AO
		COOLING COIL VALVE PID LOOP SETTINGS	< >	~		~
ZONE [1] TEMPERATURE CONTROL	ZN-T	ZONE TEMPERATURE	~	< __ >		AI
	ZN-T-SP	ZONE TEMPERATURE SETPOINT	[OCC ADJ]	[68-77 DEG F]		AI
	ZN-D-C	ZONE DAMPER COMMAND	~	0-100% OPEN		AO
		ZONE DAMPER PID LOOP SETTINGS	< >	~		~
	ZN-V-C	ZONE HEATING VALVE COMMAND	~	0-100% OPEN		AO
		ZONE HEATING VALVE PID LOOP SETTINGS	< >	~		~
ZONE [2] TEMPERATURE CONTROL	ZN-T	ZONE TEMPERATURE	~	< __ >		AI
	ZN-T-SP	ZONE TEMPERATURE SETPOINT	[OCC ADJ]	[68-77 DEG F]		AI
	ZN-D-C	ZONE DAMPER COMMAND	~	0-100% OPEN		AO
		ZONE DAMPER PID LOOP SETTINGS	< >	~		~
	ZN-V-C	ZONE HEATING VALVE COMMAND	~	0-100% OPEN		AO
		ZONE HEATING VALVE PID LOOP SETTINGS	< >	~		~
OTHER POINTS	RA-T	RETURN AIR TEMPERATURE	~	< >		AI
	MA-FLT-P-HL	MIXED AIR FILTER PRESSURE HIGH LIMIT SWITCH	< >	ALM/NORMAL		BI

LDP AND M&C DISPLAY				
LDP VIEW REQ'D	M&C		SNVT NAME	SNVT TYPE
	DISP REQ'D	TREND REQ'D		
[X]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
~	~	~	~	~
~	~	~	~	~
~	~	~	~	~
~	~	~	~	~
[~]	X	[~]	< >	TEMP_P
[~]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
[~]	[X]	[~]	<__>	HVAC_STATUS
[~]	X	[~]	< >	< >
~	~	~	~	~
[X]	X	X	< >	< >
[X]	X	[~]	< >	< >
[X]	X	X	< >	< >
[X]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
~	~	~	~	~
[X]	X	X	< >	TEMP_P
[X]	X	X	< >	< >
[X]	~	[~]	< >	< >
~	~	~	~	~
[X]	X	X	<__>	TEMP_P
[X]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
~	~	~	~	~
[X]	X	[~]	< >	< >
~	~	~	~	~
[X]	X	X	<__>	TEMP_P
[X]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
~	~	~	~	~
[X]	X	[~]	< >	< >
~	~	~	~	~
[~]	X	[~]	< >	TEMP_P
[~]	[~]	~	< >	< >

[illegible]

ALARMS			
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING NAME	BLDG ROUTING REQ'D
SUPPLY FAN PROOF FAILED		[ ~ ]	[ ~ ]
SUPPLY FAN PROOF FAILED		[ ~ ]	[ ~ ]
ALM		[ ~ ]	[ ~ ]
ALM		[ ~ ]	[ ~ ]
ALM		[ ~ ]	[ ~ ]
~		~	~
BLDG-T IS LESS THAN BLDG-T-LL		[ ~ ]	[ ~ ]
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
[ ~ ]		[ ~ ]	[ ~ ]
~		~	~
[ ~ ]		[ ~ ]	[ ~ ]
~		~	~
~		~	~
~		~	~
~		~	~
[ ~ ]		[ ~ ]	[ ~ ]
~		~	~
~		~	~
~		~	~
** ZN-T IS MORE THAN 37 DEG F ABOVE OR BELOW ZN-T-SP		[ ]	[ ~ ]
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
** ZN-T IS MORE THAN 37 DEG F ABOVE OR BELOW ZN-T-SP		[ ]	[ ~ ]
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
[ ~ ]		[ ~ ]	[ ~ ]
[ALM]		[ ~ ]	[ ~ ]

Monday, January 31, 2011

SE

**NODE ID:** <\_\_>

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE
PROOFS & SAFETIES	SF-S	SUPPLY FAN STATUS	~	ON/OFF		BI
	RF-S	RETURN FAN STATUS	~	ON/OFF		BI
	SA-SMK	SUPPLY AIR SMOKE	~	ALM/NORMAL		BI
	RA-SMK	RETURN AIR SMOKE	~	ALM/NORMAL		BI
	CLG-DA-T-LL	COOLING COIL DISCHARGE AIR TEMP LOW LIMIT	39 DEG F	ALM/NORMAL		BI
	SA-P-HL	SUPPLY AIR PRESSURE HIGH LIMIT	[__ IWC]	ALM/NORMAL		BI
	RST-BUT	SYSTEM RESET BUTTON (FOR SAFETIES)	~	~		<__>
START/STOP	BLDG-T	BUILDING TEMPERATURE (NIGHT STAT)	~	<__>		AI
	BLDG-T-LL	BUILDING TEMPERATURE LOW LIMIT SETPOINT	[55 DEG F]	~		~
	SYS-OCC	OCCUPANCY INPUT (FROM SYSTEM SCHEDULER)	~	<__>		NVI
	SF-SS	SUPPLY FAN START/STOP	~	ON/OFF		BO
	RF-SS	RETURN FAN START/STOP	~	ON/OFF		BO
	UNIT STATUS	UNIT STATUS (HTG AND/OR CLG REQUEST) (SEE NOTE)	~	HVAC_COOL/ [HVAC_HEAT]		NVO
SUPPLY FAN CAPACITY CONTROL	SA-P	SUPPLY AIR PRESSURE	~	<__>		AI
	SA-P-SP	SUPPLY AIR PRESSURE SETPOINT	<__>	~		~
	SF-C	SUPPLY FAN COMMAND	~	0-100%		AO
		SUPPLY FAN PID LOOP SETTINGS	<__>	~		~
RETURN FAN CAPACITY CONTROL	SA-F	SUPPLY AIR FLOW	~	[0 - __ CFM]		AI
	RA-F	RETURN AIR FLOW	~	[0 - __ CFM]		AI
	F-DIFF-SP	FLOW DIFFERENCE SETPOINT	[__ CFM]	~		~
	RF-C	RETURN FAN COMMAND	~	0-100%		AO
		RETURN FAN PID LOOP SETTINGS	<__>	~		~
MINIMUM OUTSIDE AIR	MINOA-F	MINIMUM OUTSIDE AIR FLOW	~	[0 - __ CFM]		AI
	MINOA-F-SP	MINIMUM OUTSIDE AIR FLOW SETPOINT (SETTING)	[__ CFM]	~		~
	MINOA-D-C	MINIMUM OUTSIDE AIR DAMPER COMMAND	~	<0-100% OPEN>		AO
		MINIMUM OUTSIDE AIR DAMPER PID LOOP SETTINGS	<__>	~		~
MIXED AIR TEMPERATURE CONTROL WITH ECONOMIZER	OA-T	OUTSIDE AIR TEMPERATURE	~	<__>		AI
	MA-D-C	MIXED AIR DAMPER COMMAND	~	0-100% OPEN		AO
	MA-T	MIXED AIR TEMPERATURE	~	<__>		AI
	MA-T-SP	MIXED AIR TEMPERATURE SETPOINT	[__]	~		~
	ECO-HL-SP	ECONOMIZER HIGH LIMIT SETPOINT	[__]	~		~
	ECO-LL-SP	ECONOMIZER LOW LIMIT SETPOINT	[__]	~		~
		MIXED AIR DAMPER PID LOOP SETTINGS	<__>	~		~
SUPPLY AIR TEMPERATURE	SA-T	SUPPLY AIR TEMPERATURE	~	<__>		AI
	SA-T-SP	SUPPLY AIR TEMPERATURE SETPOINT	[55 DEG F]	~		~
	CLG-V-C	COOLING VALVE COMMAND	~	<0-100% OPEN>		AO
		COOLING VALVE PID LOOP SETTINGS	<__>	~		~
OTHER POINTS	RA-T	RETURN AIR TEMPERATURE	~	<__>		AI
	MA-FLT-P-HL	MIXED AIR FILTER PRESSURE HIGH LIMIT SWITCH	<__>	ALM/NORMAL		BI
	OA-FLT-P-LL	OUTSIDE AIR FILTER PRESSURE HIGH LIMIT SWITCH	<__>	ALM/NORMAL		BI

LDP AND M&C DISPLAY				
LDP VIEW REQ'D	M&C		SNVT NAME	SNVT TYPE
	DISP REQ'D	TREND REQ'D		
[X]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
~	~	~	~	~
~	~	~	~	~
~	~	~	~	~
~	~	~	~	~
~	~	~	~	~
[~]	X	[~]	< >	TEMP_P
[~]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
[~]	[X]	[~]	< >	HVAC_STATUS
[X]	X	X	< >	< >
[X]	X	[~]	< >	< >
[~]	X	[~]	< >	< >
~	~	~	~	~
[X]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
[~]	X	[~]	< >	< >
~	~	~	~	~
[X]	X	X	< >	< >
[X]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
~	~	[~]	~	~
[X]	X	X	< >	< >
[X]	X	[~]	< >	< >
[X]	X	X	< >	< >
[X]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
~	~	~	~	~
[X]	X	X	< >	TEMP_P
[X]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
~	~	~	~	~
[~]	X	[~]	< >	TEMP_P
[~]	~	~	< >	< >
[~]	~	~	< >	< >

[illegible]

ALARMS			
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING NAME	BLDG ROUTING REQ'D
SUPPLY FAN PROOF FAILED		[ ]	[ ~ ]
RETURN FAN PROOF FAILED		[ ]	[ ~ ]
ALM		[ ]	[ ~ ]
ALM		[ ]	[ ~ ]
ALM		[ ]	[ ~ ]
ALM		[ ]	[ ~ ]
~		[ ]	[ ~ ]
BLDG-T LESS THAN BLDG-T-LL		[ ]	[ ~ ]
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
*SA-P MORE THAN 20% ABOVE OR BELOW SA-P-SP		<_>	[ ~ ]
~		~	~
~		~	~
~		~	~
[ ~ ]		[ ]	[ ~ ]
[ ~ ]		[ ]	[ ~ ]
~		~	~
~		~	~
~		~	~
MINOA-F LESS THAN 80% OF MINOA-F-SP		[ ]	[ ~ ]
~		~	~
~		~	~
~		~	~
[ ~ ]		[ ~ ]	[ ~ ]
~		~	~
[ ~ ]		[ ~ ]	[ ~ ]
~		~	~
~		~	~
~		~	~
~		~	~
*SA-T MORE THAN 10 DEG F ABOVE OR BELOW SETPOINT		[ ]	[ ~ ]
~		~	~
~		~	~
~		~	~
[ ~ ]		[ ]	[ ~ ]
TRUE		[ ]	[ ~ ]
TRUE		[ ]	[ ~ ]

- 1) THE CONTRACTOR SHALL COMPLETE THE POINTS SCHEDULE AS SPECIFIED AND AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS DRAWING.
- 2) UNIT MANUFACTURERS PROOFS AND SAFETIES: THE CONTRACTOR SHALL SHOW EACH PROOF AND SAFETY AS A SEPARATE ROW.
- 3) SYS-OCC: AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS, OVERRIDE OF SYS-OCC IS ACCOMPLISHED THROUGH THE SYSTEM SCHEDULER.
- 4) ALARM CONDITIONS MARKED WITH AN ASTERISK (\*) SHALL BE ACTIVE ONLY WHEN THE SYSTEM IS IN OCCUPIED MODE AND HAS BEEN IN OCCUPIED MODE FOR MORE THAN: \* = 5 MINUTES \*\* = 30 MINUTES
- 5) UNIT STATUS: SERVES AS A MONITORED POINT AT THE M&C SOFTWARE (FRONT-END) AND AS A HEATING/COOLING REQUEST TO THE BOILER, HEAT EXCHANGER, AND/OR CHILLER SERVING THIS SYSTEM.

COOLING ONLY VAV BOX

NODE: <DDC##>  
NODE LOCATION: <\_\_>  
NODE ADDRESS: Domain = <\_\_>, Subnet = <\_\_>, Node = <\_\_>  
NODE ID: <\_\_>

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE
PROOFS & SAFETIES	<__>	<UNIT MANUFACTURER'S PROOF> (SEE NOTES)	<__>	ALM/NORMAL		<BI>
	<__>	<UNIT MANUFACTURER'S SAFETIES> (SEE NOTES>	<__>	ALM/NORMAL		<BI>
START/STOP	SYS-OCC	OCCUPANCY INPUT (FROM SYSTEM SCHEDULER)	~	~		NVI
	ZN-OCC	ZONE OCCUPANCY INPUT (OCCUPANCY SENSOR)	~	~		BI
	EFF-OCC	EFFECTIVE OCCUPANCY	~	OCC/UNOCC		NVO
ZONE TEMPERATURE CONTROL	ZN-T	ZONE TEMPERATURE **	~	<__>		AI
	ZN-T-SP	ZONE TEMPERATURE SETPOINT	OCCUPANT ADJUSTABLE	[ 68-77 DEG F ]		AI
	VAV-SA-F	VAV SUPPLY AIR FLOW	~	<__>		AI
	VAV-SA-F-SP	VAV SUPPLY AIR FLOW SETPOINT	RESET SCHED	~		~
	VAV-D-C	VAV DAMPER COMMAND	~	<0-100% OPEN>		AO
		VAV DAMPER PID LOOP SETTINGS	<__>	~		~

LDP AND M&C DISPLAY				
LDP VIEW REQ'D	M&C		SNVT NAME	SNVT TYPE
	DISP REQ'D	TREND REQ'D		
~	~	~	~	~
~	~	~	~	~
[ ~ ]	X	[ ~ ]	<__>	<__>
[ ~ ]	[ ~ ]	[ ~ ]	<__>	<__>
[ ~ ]	X	[ ~ ]	<__>	OCCUPANCY
[ ~ ]	X	X	<__>	TEMP_P
[ ~ ]	X	[ ~ ]	<__>	<__>
[ ~ ]	X	[ ~ ]	<__>	<__>
[ ~ ]	[ ~ ]	[ ~ ]	<__>	<__>
[ ~ ]	X	X	<__>	<__>
~	~	~	~	~

OVERRIDES			
LDP OVRD REQ'D	M&C OVRD REQ'D	SNVT NAME	SNVT TYPE
~	~	~	~
~	~	~	~
[ ~ ]	X	<__>	<__>
~	~	~	~
~	~	~	~
~	~	~	~
[ ~ ]	X	<__>	<__>
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~

ALARMS			
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING NAME	BLDG ROUTING REQ'D
~		[ ]	[ ~ ]
ALM		[ ]	[ ~ ]
~		~	~
~		~	~
~		~	~
** ZN-T MORE THAN 77 DEG F OR BELOW 68 DEG F		[ ]	[ ~ ]
~		~	~
[ ~ ]		[ ~ ]	[ ~ ]
~		~	~
~		~	~
~		~	~

- Notes:
- 1) THE CONTRACTOR SHALL COMPLETE THE POINTS SCHEDULE AS SPECIFIED AND AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS DRAWING.
  - 2) UNIT MANUFACTURERS PROOFS AND SAFETIES: THE CONTRACTOR SHALL SHOW EACH PROOF AND SAFETY AS A SEPARATE ROW.
  - 3) SYS-OCC: AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS, OVERRIDE OF SYS-OCC IS ACCOMPLISHED THROUGH THE SYSTEM SCHEDULER.
  - 4) ALARM CONDITIONS MARKED WITH A DOUBLE ASTERISK (\*\*) SHALL BE ACTIVE ONLY WHEN THE SYSTEM IS IN OCCUPIED MODE AND HAS BEEN IN OCCUPIED MODE FOR MORE THAN 30 MINUTES.
  - 5) UNIT STATUS: SERVES AS A MONITORED POINT AT THE M&C SOFTWARE (FRONT-END) AND AS A HEATING/COOLING REQUEST TO THE BOILER, HEAT EXCHANGER, AND/OR CHILLER SERVING THIS SYSTEM.



VAV BOX WITH REHEAT

NODE: <DDC##>  
NODE LOCATION: <\_\_>  
NODE ADDRESS: Domain = <\_\_>, Subnet = <\_\_>, Node = <\_\_>  
NODE ID: <\_\_>

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE
PROOFS & SAFETIES	<__>	<UNIT MANUFACTURER'S PROOF> (SEE NOTES)	< __>	ALM/NORMAL		<BI>
	<__>	<UNIT MANUFACTURER'S SAFETIES> (SEE NOTES>	<__>	ALM/NORMAL		<BI>
START/STOP	SYS-OCC	OCCUPANCY INPUT (FROM SYSTEM SCHEDULER)	~	~		NVI
	ZN-OCC	ZONE OCCUPANCY INPUT (OCCUPANCY SENSOR)	~	~		BI
	EFF-OCC	EFFECTIVE OCCUPANCY	~	OCC/UNOCC		NVO
	UNIT STATUS	UNIT STATUS (SEE NOTES)	~	HVAC_HEAT/ HVAC_OFF		NVO
ZONE TEMPERATURE CONTROL	ZN-T	ZONE TEMPERATURE **	~	<__>		AI
	ZN-T-SP	ZONE TEMPERATURE SETPOINT	OCCUPANT ADJUSTABLE	[68-77 DEG F]		AI
	ZN-T-SP-UNOCC	ZONE TEMPERATURE SETPOINT FOR UNOCCUPIED MODE	[ 82 DEG F ]	~		~
	VAV-SA-F	VAV SUPPLY AIR FLOW	~	<__>		AI
	VAV-SA-F-SP	VAV SUPPLY AIR FLOW SETPOINT	RESET SCHED	~		~
	VAV-D-C	VAV DAMPER COMMAND	~	<0-100% OPEN>		AO
	VAV-V-C	VAV <REHEAT VALVE> <HEAT ELEMENT> COMMAND	~	<0-100% OPEN>		<AO>
		ZONE TEMPERATURE SETPOINT DEADBAND	[36 DEG F]	~		~
		VAV DAMPER PID LOOP SETTINGS	<__>	~		~
OTHER POINTS	VAV-DA-T	VAV DISCHARGE AIR TEMPERATURE	~	<__>		AI

LDP AND M&C DISPLAY				
LDP VIEW REQ'D	M&C		SNVT NAME	SNVT TYPE
	DISP REQ'D	TREND REQ'D		
~	~	~	~	~
~	~	~	~	~
[ ~ ]	X	[ ~ ]	<__>	<__>
[ ~ ]	[ ~ ]	[ ~ ]	<__>	<__>
[ ~ ]	X	[ ~ ]	<__>	OCCUPANCY
[ ~ ]	[ X ]	[ ~ ]	<__>	HVAC_STATUS
[ ~ ]	X	X	<__>	TEMP_P
[ ~ ]	X	[ ~ ]	<__>	<__>
[ ~ ]	[ ~ ]	[ ~ ]	<__>	<__>
[ ~ ]	X	[ ~ ]	<__>	<__>
[ ~ ]	[ ~ ]	[ ~ ]	<__>	<__>
[ ~ ]	X	X	<__>	<__>
[ ~ ]	X	[ ~ ]	<__>	<__>
~	~	~	~	~
~	~	~	~	~
~	~	~	~	~
[ ~ ]	X	X	<__>	TEMP_P

OVERRIDES			
LDP OVRD REQ'D	M&C OVRD REQ'D	SNVT NAME	SNVT TYPE
~	~	~	~
~	~	~	~
SEE NOTES			
~	~	~	~
[ ~ ]	~	~	~
~	~	~	~
~	~	~	~
[ ~ ]	~	~	~
[ ~ ]	[ ~ ]	<__>	<__>
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~

ALARMS			
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING NAME	BLDG ROUTING REQ'D
~		[ ]	[ ~ ]
ALM		[ ]	[ ~ ]
~		~	~
~		~	~
~		~	~
~		~	~
** ZN-T MORE THAN 77 DEG F OR BELOW 68 DEG F		[ ]	[ ~ ]
~		~	~
~		~	~
[ ~ ]		[ ]	[ ~ ]
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
[ ~ ]		[ ]	[ ~ ]

- Notes:
- THE CONTRACTOR SHALL COMPLETE THE POINTS SCHEDULE AS SPECIFIED AND AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS DRAWING.
  - UNIT MANUFACTURERS PROOFS AND SAFETIES: THE CONTRACTOR SHALL SHOW EACH PROOF AND SAFETY AS A SEPARATE ROW.
  - SYS-OCC: AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS, OVERRIDE OF SYS-OCC IS ACCOMPLISHED THROUGH THE SYSTEM SCHEDULER.
  - ALARM CONDITIONS MARKED WITH A DOUBLE ASTERISK (\*\*) SHALL BE ACTIVE ONLY WHEN THE SYSTEM IS IN OCCUPIED MODE AND HAS BEEN IN OCCUPIED MODE FOR MORE THAN 30 MINUTES.
  - UNIT STATUS: SERVES AS A MONITORED POINT AT THE M&C SOFTWARE (FRONT-END) AND AS A HEATING/COOLING REQUEST TO THE BOILER, HEAT EXCHANGER, AND/OR CHILLER SERVING THIS SYSTEM.

### **SERIES FAN POWERED VAV BOX [WITH REHEAT]**

AND

### PARALLEL FAN POWERED VAV BOX [WITH REHEAT]

**NODE: <DDC##>**

**NODE LOCATION:** <\_\_\_>

**NODE ADDRESS:** Domain = <\_\_>, Subnet = <\_\_>, Node = <\_\_>

**NODE ID:** <\_\_>

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE
PROOFS & SAFETIES	<__>	<UNIT MANUFACTURER'S PROOF> (SEE NOTES)	<__>	ALM/NORMAL		<BI>
	<__>	<UNIT MANUFACTURER'S SAFETIES> (SEE NOTES)	<__>	ALM/NORMAL		<BI>
START/STOP	SYS-OCC	OCCUPANCY INPUT (FROM SYSTEM SCHEDULER)	~	~		NVI
	ZN-OCC	ZONE OCCUPANCY INPUT (OCCUPANCY SENSOR)	~	~		BI
	EFF-OCC	EFFECTIVE OCCUPANCY	~	OCC/UNOCC		NVO
	UNIT STATUS	UNIT STATUS (SEE NOTES)	~	HVAC_HEAT/ HVAC_OFF		NVO
ZONE TEMPERATURE CONTROL	ZN-T	ZONE TEMPERATURE **	~	<__>		AI
	ZN-T-SP	ZONE TEMPERATURE SETPOINT	OCCUPANT ADJUSTABLE	[68-77 DEG F]		AI
	ZN-T-SP-UNOCC	ZONE TEMPERATURE SETPOINT FOR UNOCCUPIED MODE	[ 82 DEG F ]	~		~
	VAV-SA-F	VAV SUPPLY AIR FLOW	~	<__>		AI
	VAV-SA-F-SP	VAV SUPPLY AIR FLOW SETPOINT	RESET SCHED	~		~
	VAV-D-C	VAV DAMPER COMMAND	~	<0-100% OPEN>		AO
	VAV-V-C	VAV <REHEAT VALVE> <HEAT ELEMENT> COMMAND	~	<0-100% OPEN>		<AO>
	VAV-FAN-SS	VAV FAN START/STOP	~	START/STOP		BO
		ZONE TEMPERATURE SETPOINT DEADBAND	<36 DEG F>	~		~
			<__>	~		~
			<__>	~		~
OTHER POINTS	VAV-DA-T	VAV DISCHARGE AIR TEMPERATURE	~	<__>		AI

LDP AND M&C DISPLAY				
LDP VIEW REQ'D	M&C		SNVT NAME	SNVT TYPE
	DISP REQ'D	TREND REQ'D		
~	~	~	~	~
~	~	~	~	~
[ ~ ]	X	[ ~ ]	< _ >	< _ >
[ ~ ]	[ ~ ]	[ ~ ]	< _ >	< _ >
[ ~ ]	X	[ ~ ]	< _ >	OCCUPANCY
[ ~ ]	[ X ]	[ ~ ]	< _ >	HVAC_STATUS
[ ~ ]	X	X	< _ >	TEMP_P
[ ~ ]	X	[ ~ ]	< _ >	< _ >
[ ~ ]	[ ~ ]	[ ~ ]	< _ >	< _ >
[ ~ ]	X	[ ~ ]	< _ >	< _ >
[ ~ ]	[ ~ ]	[ ~ ]	< _ >	< _ >
[ ~ ]	X	X	< _ >	< _ >
[ ~ ]	X	[ ~ ]	< _ >	< _ >
[ ~ ]	X	[ ~ ]	< _ >	< _ >
~	~	~	~	~
~	~	~	~	~
~	~	~	~	~
[ ~ ]	X	X	< _ >	TEMP_P

[illegible]

ALARMS			
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING NAME	BLDG ROUTING REQ'D
~		[ ]	[ ~ ]
ALM		[ ]	[ ~ ]
~		~	~
~		~	~
~		~	~
~		~	~
** ZN-T MORE THAN 77 DEG F OR BELOW 68 DEG F		[ ]	[ ~ ]
~		~	~
~		~	~
[ ~ ]		[ ]	[ ~ ]
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
[ ~ ]		[ ]	[ ~ ]

Notes:

- 1) THE CONTRACTOR SHALL COMPLETE THE POINTS SCHEDULE AS SPECIFIED AND AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS DRAWING.
- 2) UNIT MANUFACTURERS PROOFS AND SAFETIES: THE CONTRACTOR SHALL SHOW EACH PROOF AND SAFETY AS A SEPARATE ROW.
- 3) SYS-OCC: AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS, OVERRIDE OF SYS-OCC IS ACCOMPLISHED THROUGH THE SYSTEM SCHEDULER.
- 4) ALARM CONDITIONS MARKED WITH A DOUBLE ASTERISK (\*\*) SHALL BE ACTIVE ONLY WHEN THE SYSTEM IS IN OCCUPIED MODE AND HAS BEEN IN OCCUPIED MODE FOR MORE THAN 30 MINUTES.
- 5) UNIT STATUS: SERVES AS A MONITORED POINT AT THE M&C SOFTWARE (FRONT-END) AND AS A HEATING/COOLING REQUEST TO THE BOILER, HEAT EXCHANGER, AND/OR CHILLER SERVING THIS SYSTEM.

DUAL TEMPERATURE FAN COIL UNIT

NODE: <DDC##>  
NODE LOCATION: <\_\_>  
NODE ADDRESS: Domain = <\_\_>, Subnet = <\_\_>, Node = <\_\_>  
NODE ID: <\_\_>

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE
PROOFS & SAFETIES	<__>	<UNIT MANUFACTURER'S PROOF> (SEE NOTES)	<__>	ALM/NORMAL		<BI>
	<__>	<UNIT MANUFACTURER'S SAFETIES> (SEE NOTES>	<__>	ALM/NORMAL		<BI>
START/STOP	SYS-OCC	OCCUPANCY INPUT (FROM SYSTEM SCHEDULER)	~	OCC/UNOCC		NVI
	ZN-OCC	ZONE OCCUPANCY INPUT (OCCUPANCY SENSOR)	~	OCC/UNOCC		BI
	EFF-OCC	EFFECTIVE OCCUPANCY	~	OCC/UNOCC		NVO
	UNIT STATUS	UNIT STATUS (SEE NOTES)	~	HVAC_HEAT/ HVAC_OFF		NVO
ZONE TEMPERATURE CONTROL	DTWS-T	DUAL TEMP WATER SUPPLY TEMPERATURE	~	<__>		<AI>
	DTWS-T-SP	DUAL TEMP WATER SUPPLY TEMPERATURE SETPOINT	~	<__>		<AI>
	ZN-T	ZONE TEMPERATURE **	~	<__>		AI
	ZN-T-SP	ZONE TEMPERATURE SETPOINT	OCCUPANT ADJUSTABLE	[68-77 DEG F]		AI
	ZN-T-SP-HTG-UNOCC	ZONE TEMPERATURE SETPOINT FOR UNOCCUPIED MODE	[ 60 DEG F ]	~		~
	ZN-T-SP-CLG-UNOCC	ZONE TEMPERATURE SETPOINT FOR UNOCCUPIED MODE	[ 82 DEG F ]	~		~
	DT-V-C	DUAL TEMP VALVE COMMAND	~	<0-100% OPEN>		AO
	OFF/AUTO	UNIT OFF/AUTO SWITCH	~	OFF/AUTO		BI
	SF-SS	SUPPLY FAN START/STOP	~	[OFF/LO/MED/HI]		BO
		DUAL TEMP VALVE PID LOOP SETTINGS	~	~		~

LDP AND M&C DISPLAY				
LDP VIEW REQ'D	M&C		SNVT NAME	SNVT TYPE
	DISP REQ'D	TREND REQ'D		
~	~	~	~	~
~	~	~	~	~
[ ~ ]	X	[ ~ ]	<__>	<__>
[ ~ ]	[ ~ ]	[ ~ ]	<__>	<__>
[ ~ ]	X	[ ~ ]	<__>	OCCUPANCY
[ ~ ]	[ X ]	[ ~ ]	<__>	HVAC_STATUS
[ ~ ]	X	X	<__>	<__>
[ ~ ]	X	X	<__>	<__>
[ ~ ]	X	X	<__>	TEMP_P
[ ~ ]	X	[ ~ ]	<__>	<__>
[ ~ ]	[ ~ ]	[ ~ ]	<__>	<__>
[ ~ ]	[ ~ ]	[ ~ ]	<__>	<__>
[ ~ ]	X	[ ~ ]	<__>	<__>
[ ~ ]	~	~	~	~

OVERRIDES			
LDP OVRD REQ'D	M&C OVRD REQ'D	SNVT NAME	SNVT TYPE
~	~	~	~
~	~	~	~
SEE NOTES			
~	~	~	~
[ ~ ]	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
[ ~ ]	X	<__>	<__>
[ ~ ]	[ ~ ]	<__>	<__>
[ ~ ]	[ ~ ]	<__>	<__>
~	~	~	~
[ ~ ]	[ ~ ]	~	~
~	~	~	~
~	~	~	~

ALARMS			
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING NAME	BLDG ROUTING REQ'D
~		[ ]	[ ~ ]
ALM		[ ]	[ ~ ]
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
** ZN-T MORE THAN 77 DEG F OR BELOW 68 DEG F		[ ]	[ ~ ]
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~

- Notes:
- 1) THE CONTRACTOR SHALL COMPLETE THE POINTS SCHEDULE AS SPECIFIED AND AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS DRAWING.
  - 2) UNIT MANUFACTURERS PROOFS AND SAFETIES: THE CONTRACTOR SHALL SHOW EACH PROOF AND SAFETY AS A SEPARATE ROW.
  - 3) SYS-OCC: AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS, OVERRIDE OF SYS-OCC IS ACCOMPLISHED THROUGH THE SYSTEM SCHEDULER.
  - 4) ALARM CONDITIONS MARKED WITH AN ASTERISK (\*) SHALL BE ACTIVE ONLY WHEN THE SYSTEM IS IN OCCUPIED MODE AND HAS BEEN IN OCCUPIED MODE FOR MORE THAN: \* = 5 MINUTES \*\* = 30 MINUTES
  - 5) UNIT STATUS: SERVES AS A MONITORED POINT AT THE M&C SOFTWARE (FRONT-END) AND AS A HEATING/COOLING REQUEST TO THE BOILER, HEAT EXCHANGER, AND/OR CHILLER SERVING THIS SYSTEM.

HYDRONIC HEATING HOT WATER FROM DISTRIBUTED STEAM CONVERTER

NODE: <DDC##>  
NODE LOCATION: <\_\_>  
NODE ADDRESS: Domain = <\_\_>, Subnet = <\_\_>, Node = <\_\_>  
NODE ID: < \_\_ >

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE
PROOFS & SAFETIES	HW-PMP-S	HOT WATER PUMP STATUS	~	ON/OFF		
START/STOP	SYS-ENA	SYSTEM ENABLE	~	ENABLE/DISABLE		<NVI>
	HW-PMP-SS	HOT WATER PUMP START/STOP	~	START/STOP		BO
	UNIT STATUS	HEATING MODE UNIT STATUS (SEE NOTES)	~	ON/OFF		NVO
HEAT EXCHANGER VALVE CONTROL (STEAM)	OA-T	OUTSIDE AIR TEMPERATURE	~	< >		AI
	HWS-T	HOT WATER SUPPLY TEMPERATURE	~	<__>		AI
	HWS-T-SP	HOT WATER SUPPLY TEMPERATURE SETPOINT	[RESET]	~		~
	STM-V-C	STEAM VALVE COMMAND	~	0-100% OPEN		AO
		STEAM VALVE PID LOOP SETTINGS	< >	~		~
SYSTEMS SERVED	HTG-RQST1	HTG RQST FROM: AHU [ __ ], BUILDING [ __ ]	~	HVAC_HEAT/ HVAC_OFF		NVI
	HTG-RQST2	HTG RQST FROM: AHU [ __ ], BUILDING [ __ ]	~	HVAC_HEAT/ HVAC_OFF		NVI
OTHER POINTS	HWR-T	HOT WATER RETURN TEMPERATURE	~	< >		AI

LDP AND M&C DISPLAY				
LDP VIEW REQ'D	M&C		SNVT NAME	SNVT TYPE
	DISP REQ'D	TREND REQ'D		
[X]	X	[~]	< >	< >
[X]	[X]	[~]	< >	< >
[~]	[~]	[~]	< >	< >
~	[X]	[~]	< >	< >
[X]	X	[~]	< >	< >
[X]	X	X	<__>	<__>
[X]	X	X	<__>	<__>
[X]	X	[X]	< >	< >
~	~	~	~	~
~	X	~	<__>	HVAC_STATUS
~	X	~	<__>	HVAC_STATUS
[X]	X	[~]	< >	< >

OVERRIDES			
LDP OVRD REQ'D	M&C OVRD REQ'D	SNVT NAME	SNVT TYPE
~	~	~	~
			< >
[~]	X	< >	< >
[~]	X	< >	< >
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~

ALARMS			
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING NAME	BLDG ROUTING REQ'D
~		[ ]	[~]
~		~	~
~		~	~
~		[~]	[~]
~		~	~
HWS-T MORE THAN 41 DEG F ABOVE OR BELOW HWS-T-SP		[ ]	[~]
~		~	~
~		[~]	[~]
~		~	~
~		~	~
~		~	~
[~]		~	~

- Notes:
- 1) THE CONTRACTOR SHALL COMPLETE THE POINTS SCHEDULE AS SPECIFIED AND AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS DRAWING.
  - 2) UNIT MANUFACTURERS PROOFS AND SAFETIES: THE CONTRACTOR SHALL SHOW EACH PROOF AND SAFETY AS A SEPARATE ROW.
  - 3) SYS-OCC: AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS, OVERRIDE OF SYS-OCC IS ACCOMPLISHED THROUGH THE SYSTEM SCHEDULER.
  - 4) ALARM CONDITIONS MARKED WITH AN ASTERISK (\*) SHALL BE ACTIVE ONLY WHEN THE SYSTEM IS IN OCCUPIED MODE AND HAS BEEN IN OCCUPIED MODE FOR MORE THAN: \* = 5 MINUTES \*\* = 30 MINUTES
  - 5) UNIT STATUS: SERVES AS A MONITORED POINT AT THE M&C SOFTWARE (FRONT-END) AND AS A HEATING/COOLING REQUEST TO THE BOILER, HEAT EXCHANGER, AND/OR CHILLER SERVING THIS SYSTEM.

HYDRONIC HEATING HOT WATER FROM DISTRIBUTED HTHW CONVERTER

NODE: <DDC##>  
NODE LOCATION: <\_\_>  
NODE ADDRESS: Domain = <\_\_>, Subnet = <\_\_>, Node = <\_\_>  
NODE ID: < \_\_ >

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE
PROOFS & SAFETIES	HW-PMP-S	HOT WATER PUMP STATUS	~	ON/OFF		
START/STOP	SYS-ENA	SYSTEM ENABLE	~	ENABLE/DISABLE		<NVI>
	HW-PMP-SS	HOT WATER PUMP START/STOP	~	START/STOP		BO
	UNIT STATUS	HEATING MODE UNIT STATUS (SEE NOTES)	~	ON/OFF		NVO
HEAT EXCHANGER VALVE CONTROL (STEAM)	OA-T	OUTSIDE AIR TEMPERATURE	~	< >		AI
	HWS-T	HOT WATER SUPPLY TEMPERATURE	~	<__>		AI
	HWS-T-SP	HOT WATER SUPPLY TEMPERATURE SETPOINT	[RESET]	~		~
	HTHW-V-C	HTHW VALVE COMMAND	~	0-100% OPEN		AO
		HTHW VALVE PID LOOP SETTINGS	< >	~		~
SYSTEMS SERVED	HTG-RQST1	HTG RQST FROM: AHU [ __ ], BUILDING [ __ ]	~	HVAC_HEAT/ HVAC_OFF		NVI
	HTG-RQST2	HTG RQST FROM: AHU [ __ ], BUILDING [ __ ]	~	HVAC_HEAT/ HVAC_OFF		NVI
OTHER POINTS	HWR-T	HOT WATER RETURN TEMPERATURE	~	< >		AI

LDP AND M&C DISPLAY				
LDP VIEW REQ'D	M&C		SNVT NAME	SNVT TYPE
	DISP REQ'D	TREND REQ'D		
[ X ]	X	[ ~ ]	< >	< >
[ X ]	[ X ]	[ ~ ]	< >	< >
[ ~ ]	[ ~ ]	[ ~ ]	< >	< >
~	[ X ]	[ ~ ]	< >	< >
[ X ]	X	[ ~ ]	< >	< >
[ X ]	X	X	<__>	<__>
[ X ]	X	X	<__>	<__>
[ X ]	X	[ X ]	< >	< >
~	~	~	~	~
~	X	~	<__>	HVAC_STATUS
~	X	~	<__>	HVAC_STATUS
[ X ]	X	[ ~ ]	< >	< >

OVERRIDES			
LDP OVRD REQ'D	M&C OVRD REQ'D	SNVT NAME	SNVT TYPE
~	~	~	~
			< >
[ ~ ]	X	< >	< >
[ ~ ]	X	< >	< >
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~

ALARMS			
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING NAME	BLDG ROUTING REQ'D
~		[ ]	[ ~ ]
~		~	~
~		~	~
~		[ ~ ]	[ ~ ]
~		~	~
HWS-T MORE THAN 41 DEG F ABOVE OR BELOW HWS-T-SP		[ ]	[ ~ ]
~		~	~
~		[ ~ ]	[ ~ ]
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
[ ~ ]		~	~

- Notes:
- 1) THE CONTRACTOR SHALL COMPLETE THE POINTS SCHEDULE AS SPECIFIED AND AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS DRAWING.
  - 2) UNIT MANUFACTURERS PROOFS AND SAFETIES: THE CONTRACTOR SHALL SHOW EACH PROOF AND SAFETY AS A SEPARATE ROW.
  - 3) SYS-OCC: AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS, OVERRIDE OF SYS-OCC IS ACCOMPLISHED THROUGH THE SYSTEM SCHEDULER.
  - 4) ALARM CONDITIONS MARKED WITH AN ASTERISK (\*) SHALL BE ACTIVE ONLY WHEN THE SYSTEM IS IN OCCUPIED MODE AND HAS BEEN IN OCCUPIED MODE FOR MORE THAN: \* = 5 MINUTES \*\* = 30 MINUTES
  - 5) UNIT STATUS: SERVES AS A MONITORED POINT AT THE M&C SOFTWARE (FRONT-END) AND AS A HEATING/COOLING REQUEST TO THE BOILER, HEAT EXCHANGER, AND/OR CHILLER SERVING THIS SYSTEM.

HYDRONIC HEATING HOT WATER FROM SINGLE BUILDING BOILER

NODE: <DDC##>  
NODE LOCATION: <\_\_>  
NODE ADDRESS: Domain = <\_\_>, Subnet = <\_\_>, Node = <\_\_>  
NODE ID: <\_\_>

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE
PROOFS & SAFETIES	HW-PMP-S	HOT WATER PUMP STATUS	~	ON/OFF		
START/STOP	SYS-ENA	SYSTEM ENABLE	~	ENABLE/DISABLE		<NVI>
	HW-PMP-SS	HOT WATER PUMP START/STOP	~	START/STOP		BO
	UNIT STATUS	HEATING MODE UNIT STATUS (SEE NOTES)	~	ON/OFF		NVO
HOT WATER TEMPERATURE CONTROL	OA-T	OUTSIDE AIR TEMPERATURE	~	<__>		AI
	HWS-T	HOT WATER SUPPLY TEMPERATURE	~	<__>		AI
	HWS-T-SP	HOT WATER SUPPLY TEMPERATURE SETPOINT	[RESET]	~		~
	HW-V-C	HOT WATER VALVE COMMAND	~	0-100% OPEN		AO
		HOT WATER VALVE PID LOOP SETTINGS	<__>	~		~
SYSTEMS SERVED	HTG-RQST1	HTG RQST FROM: AHU [__], BUILDING [__]	~	HVAC_HEAT/ HVAC_OFF		NVI
	HTG-RQST2	HTG RQST FROM: AHU [__], BUILDING [__]	~	HVAC_HEAT/ HVAC_OFF		NVI
OTHER POINTS	HWR-T	HOT WATER RETURN TEMPERATURE	~	<__>		AI
	BLR-S	BOILER STATUS (STATE)	~	START/STOP		<BI>

LDP VIEW REQ'D	M&C		SNVT NAME	SNVT TYPE
	DISP REQ'D	TREND REQ'D		
[X]	X	[~]	<__>	<__>
[X]	[X]	[~]	<__>	<__>
[~]	[~]	[~]	<__>	<__>
~	[X]	[~]	<__>	<__>
[X]	X	[~]	<__>	<__>
[X]	X	X	<__>	<__>
[X]	X	X	<__>	<__>
[X]	X	[X]	<__>	<__>
~	~	~	~	~
~	X	~	<__>	HVAC_STATUS
~	X	~	<__>	HVAC_STATUS
[X]	X	[~]	<__>	<__>
[X]	X	[X]	<__>	<__>

LDP OVRD REQ'D	M&C OVRD REQ'D	SNVT	
		NAME	TYPE
~	~	~	~
			<__>
[~]	X	<__>	<__>
[~]	X	<__>	<__>
~	~	~	~
~	~	~	~
~	~	~	~
[~]	X	<__>	<__>
[~]	X	<__>	<__>
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~

ALARMS			
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING NAME	BLDG ROUTING REQ'D
~		[__]	[~]
~		~	~
~		~	~
~		[~]	[~]
~		~	~
HWS-T MORE THAN 41 DEG F ABOVE OR BELOW HWS-T-SP		[__]	[~]
~		~	~
~		[~]	[~]
~		~	~
~		~	~
~		~	~
[~]		~	~
~		~	~

- Notes:
- 1) THE CONTRACTOR SHALL COMPLETE THE POINTS SCHEDULE AS SPECIFIED AND AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS DRAWING.
  - 2) UNIT MANUFACTURERS PROOFS AND SAFETIES: THE CONTRACTOR SHALL SHOW EACH PROOF AND SAFETY AS A SEPARATE ROW.
  - 3) SYS-OCC: AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS, OVERRIDE OF SYS-OCC IS ACCOMPLISHED THROUGH THE SYSTEM SCHEDULER.
  - 4) ALARM CONDITIONS MARKED WITH AN ASTERISK (\*) SHALL BE ACTIVE ONLY WHEN THE SYSTEM IS IN OCCUPIED MODE AND HAS BEEN IN OCCUPIED MODE FOR MORE THAN: \* = 5 MINUTES \*\* = 30 MINUTES
  - 5) UNIT STATUS: SERVES AS A MONITORED POINT AT THE M&C SOFTWARE (FRONT-END) AND AS A HEATING/COOLING REQUEST TO THE BOILER, HEAT EXCHANGER, AND/OR CHILLER SERVING THIS SYSTEM.

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE
PROOFS & SAFETIES	HX-P-LL	HEAT EXCHANGER DIFFERENTIAL PRESSURE LOW LIMIT	~	FLOW/NO FLOW		BI
	DT-PMP-S	DUAL TEMP PUMP STATUS	~	ON/OFF		~
START/STOP	SYS-ENA	SYSTEM ENABLE	~	ENABLE/DISABLE		<NVI>
	HTG/COOL-MOD	HEATING/COOLING MODE SWITCH	~	HEAT/COOL		BI
	DT-PMP-SS	DUAL TEMP PUMP START/STOP COMMAND	~	START/STOP		BO
	UNIT STATUS	HEATING MODE UNIT STATUS (SEE NOTES)	~	ON/OFF		NVO
DUAL TEMP SWITCHOVER	DTWR-T	DUAL-TEMP WATER RETURN TEMPERATURE	~	< >		AI
	DTWR-T-LL	DUAL-TEMP WATER RETURN TEMPERATURE LOW LIMIT	65 DEG F	~		~
	DTWR-T-HL	DUAL-TEMP WATER RETURN TEMPERATURE HIGH LIMIT	85 DEG F	~		~
	DT-V-2P	DUAL-TEMP SWITCHOVER VALVE	~	HEAT/COOL		BO
	CHLR-ENA	CHILLER ENABLE	~	ENABLE/DISABLE		BO
HEAT EXCHANGER VALVE CONTROL (STEAM)	OA-T	OUTSIDE AIR TEMPERATURE	~	< >		AI
	HWS-T	HOT WATER SUPPLY TEMPERATURE	~	< __ >		AI
	HWS-T-SP	HOT WATER SUPPLY TEMPERATURE SETPOINT	[RESET]	~		~
	STM-V-C	STEAM VALVE COMMAND	~	0-100% OPEN		AO
		STEAM VALVE PID LOOP SETTINGS	< >	~		~
SYSTEMS SERVED	HTG-RQST1	HTG RQST FROM: AHU [ __ ], BUILDING [ __ ]	~	HVAC_HEAT/ HVAC_OFF		NVI
	HTG-RQST2	HTG RQST FROM: AHU [ __ ], BUILDING [ __ ]	~	HVAC_HEAT/ HVAC_OFF		NVI
OTHER POINTS	HWR-T	HOT WATER RETURN TEMPERATURE	~	< >		AI
	DTWS-T	DUAL-TEMP WATER SUPPLY TEMPERATURE	~	< >		AI

[illegible]

Notes:

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- 2) UNIT MANUFACTURERS PROOFS AND SAFETIES: THE CONTRACTOR SHALL SHOW EACH PROOF AND SAFETY AS A SEPARATE ROW.
- 3) SYS-OCC: AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS, OVERRIDE OF SYS-OCC IS ACCOMPLISHED THROUGH THE SYSTEM SCHEDULER.
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- 5) UNIT STATUS: SERVES AS A MONITORED POINT AT THE M&C SOFTWARE (FRONT-END) AND AS A HEATING/COOLING REQUEST TO THE BOILER, HEAT EXCHANGER, AND/OR CHILLER SERVING THIS SYSTEM.

HYDRONIC DUAL-TEMPERATURE SYSTEM WITH HIGH TEMPERATURE HOT WATER HEAT EXCHANGER AND CHILLED WATER

NODE: <DDC##>  
NODE LOCATION: <\_\_>  
NODE ADDRESS: Domain = <\_\_>, Subnet = <\_\_>, Node = <\_\_>  
NODE ID: <\_\_>

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE
PROOFS & SAFETIES	HX-P-LL	HEAT EXCHANGER DIFFERENTIAL PRESSURE LOW LIMIT	~	FLOW/NO FLOW		BI
	DT-PMP-S	DUAL TEMP PUMP STATUS	~	ON/OFF		~
START/STOP	SYS-ENA	SYSTEM ENABLE	~	ENABLE/DISABLE		<NVI>
	HTG/COOL-MOD	HEATING/COOLING MODE SWITCH	~	HEAT/COOL		BI
	DT-PMP-SS	DUAL TEMP PUMP START/STOP COMMAND	~	START/STOP		BO
	UNIT STATUS	HEATING MODE UNIT STATUS (SEE NOTES)	~	ON/OFF		NVO
DUAL TEMP SWITCHOVER	DTWR-T	DUAL-TEMP WATER RETURN TEMPERATURE	~	< >		AI
	DTWR-T-LL	DUAL-TEMP WATER RETURN TEMPERATURE LOW LIMIT	65 DEG F	~		~
	DTWR-T-HL	DUAL-TEMP WATER RETURN TEMPERATURE HIGH LIMIT	85 DEG F	~		~
	DT-V-2P	DUAL-TEMP SWITCHOVER VALVE	~	HEAT/COOL		BO
	CHLR-ENA	CHILLER ENABLE	~	ENABLE/DISABLE		BO
HEAT EXCHANGER VALVE CONTROL (HTHW)	OA-T	OUTSIDE AIR TEMPERATURE	~	< >		AI
	HWS-T	HOT WATER SUPPLY TEMPERATURE	~	<__>		AI
	HWS-T-SP	HOT WATER SUPPLY TEMPERATURE SETPOINT	[RESET]	~		~
	HTHW-V-C	HTHW VALVE COMMAND	~	0-100% OPEN		AO
		HTHW VALVE PID LOOP SETTINGS	< >	~		~
SYSTEMS SERVED	HTG-RQST1	HTG RQST FROM: AHU [__], BUILDING [__]	~	HVAC_HEAT/ HVAC_OFF		NVI
	HTG-RQST2	HTG RQST FROM: AHU [__], BUILDING [__]	~	HVAC_HEAT/ HVAC_OFF		NVI
OTHER POINTS	HWR-T	HOT WATER RETURN TEMPERATURE	~	< >		AI
	DTWS-T	DUAL-TEMP WATER SUPPLY TEMPERATURE	~	< >		AI

LDP AND M&C DISPLAY				
LDP VIEW REQ'D	M&C		SNVT NAME	SNVT TYPE
	DISP REQ'D	TREND REQ'D		
[~]	X	[~]	< >	< >
[~]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
[~]	X	[~]	< >	< >
[~]	[~]	[~]	< >	< >
~	[X]	[~]	< >	< >
[~]	X	[~]	< >	< >
[~]	[~]	[~]	< >	< >
[~]	[~]	[~]	< >	< >
[~]	X	[~]	< >	< >
[~]	X	[~]	< >	< >
[X]	X	[~]	< >	< >
[X]	X	X	<__>	<__>
[X]	X	X	<__>	<__>
[X]	X	[X]	< >	< >
~	~	~	~	~
~	X	~	<__>	HVAC_STATUS
~	X	~	<__>	HVAC_STATUS
[X]	X	[~]	< >	< >
[X]	X	[~]	< >	< >

OVERRIDES			
LDP OVRD REQ'D	M&C OVRD REQ'D	SNVT NAME	SNVT TYPE
~	~	~	~
~	~	~	~
[~]	X	< >	< >
[~]	X	< >	< >
[~]	X	< >	< >
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
[~]	X	< >	< >
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
[~]	X	< >	< >
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~
~	~	~	~

ALARMS			
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING NAME	BLDG ROUTING REQ'D
* HWS FLOW PROOF FAILED		[ ]	[~]
~		[ ]	[~]
~		~	~
~		~	~
~		~	~
~		[~]	[~]
[~]		[~]	[~]
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
~		~	~
DTWS-T MORE THAN 41 DEG F ABOVE OR BELOW DTWS-T-SP		[ ]	[~]
~		~	~
~		[~]	[~]
~		~	~
~			
~		~	~
~		~	~
~		~	~
[~]		~	~
[~]		~	~

- Notes:
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  - 2) UNIT MANUFACTURERS PROOFS AND SAFETIES: THE CONTRACTOR SHALL SHOW EACH PROOF AND SAFETY AS A SEPARATE ROW.
  - 3) SYS-OCC: AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS, OVERRIDE OF SYS-OCC IS ACCOMPLISHED THROUGH THE SYSTEM SCHEDULER.
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  - 5) UNIT STATUS: SERVES AS A MONITORED POINT AT THE M&C SOFTWARE (FRONT-END) AND AS A HEATING/COOLING REQUEST TO THE BOILER, HEAT EXCHANGER, AND/OR CHILLER SERVING THIS SYSTEM.



HYDRONIC SECONDARY WITH CONSTANT SPEED PUMPING

NODE: <DDC##>  
NODE LOCATION: <\_\_>  
NODE ADDRESS: Domain = <\_\_>, Subnet = <\_\_>, Node = <\_\_>  
NODE ID: < \_\_ >

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE
START/STOP	SYS-ENA	SYSTEM ENABLE	~	~		<NVI>
	SEC-PMP-SS	CHILLED WATER PUMP START/STOP	~	START/STOP		BO
	SEC-PMP-S	CHILLED WATER PUMP STATUS	~	ON/OFF		BI

LDP AND M&C DISPLAY				
LDP VIEW REQ'D	M&C		SNVT NAME	SNVT TYPE
	DISP REQ'D	TREND REQ'D		
[~]	X	[~]	< >	< >
[~]	X	[~]	< >	< >
[~]	X	[~]	< >	< >

OVERRIDES			
LDP OVRD REQ'D	M&C OVRD REQ'D	SNVT NAME	SNVT TYPE
[~]	[~]	< >	< >
[~]	[~]	< >	< >
~	~	~	~

ALARMS			
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING NAME	BLDG ROUTING REQ'D
~		~	~
~		~	~
~		~	~

- Notes:
- 1) THE CONTRACTOR SHALL COMPLETE THE POINTS SCHEDULE AS SPECIFIED AND AS DESCRIBED IN THE POINTS SCHEDULE INSTRUCTIONS DRAWING.
  - 2) UNIT MANUFACTURERS PROOFS AND SAFETIES: THE CONTRACTOR SHALL SHOW EACH PROOF AND SAFETY AS A SEPARATE ROW.
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  - 4) ALARM CONDITIONS MARKED WITH AN ASTERISK (\*) SHALL BE ACTIVE ONLY WHEN THE SYSTEM IS IN OCCUPIED MODE AND HAS BEEN IN OCCUPIED MODE FOR MORE THAN: \* = 5 MINUTES \*\* = 30 MINUTES
  - 5) UNIT STATUS: SERVES AS A MONITORED POINT AT THE M&C SOFTWARE (FRONT-END) AND AS A HEATING/COOLING REQUEST TO THE BOILER, HEAT EXCHANGER, AND/OR CHILLER SERVING THIS SYSTEM.

SECONDARY HYDRONIC WITH VARIABLE SPEED PUMPING

NODE: <DDC##>  
NODE LOCATION: <\_\_>  
NODE ADDRESS: Domain = <\_\_>, Subnet = <\_\_>, Node = <\_\_>  
NODE ID: < \_\_ >

FUNCTION	NAME	DESCRIPTION	SETTING (WITH UNITS)	RANGE (WITH UNITS)	nci/CPT NAME	IO TYPE
START/STOP	SYS-ENA	SYSTEM ENABLE	~	~		<NVI>
	SEC-PMP-SS	CHILLED WATER PUMP START/STOP	~	START/STOP		BO
	SEC-PMP-S	CHILLED WATER PUMP STATUS	~	ON/OFF		BI
PRESSURE CONTROL	SEC-PMP-C	CHILLED WATER VFD PUMP SPEED COMMAND	~	<0-100%>		AO
	SEC-P	CHILLED WATER SUPPLY PRESSURE	~	<__>		AI
	SEC-P-SP	CHILLED WATER SUPPLY PRESSURE SETPOINT	[ ]	~		~
		CHILLED WATER PUMP PID LOOP SETTINGS	< __ >	~		~

LDP AND M&C DISPLAY				
LDP VIEW REQ'D	M&C		SNVT NAME	SNVT TYPE
	DISP REQ'D	TREND REQ'D		
[~]	X	[~]	< >	< >
[~]	X	[~]	< >	< >
[~]	X	[~]	< >	< >
[~]	X	[~]	< >	< >
~	[~]	[~]	<__>	<__>
[~]	[~]	[~]	<__>	<__>
~	~	~	~	~

OVERRIDES			
LDP OVRD REQ'D	M&C OVRD REQ'D	SNVT NAME	SNVT TYPE
[~]	[~]	< __ >	< __ >
[~]	[~]	< __ >	< __ >
~	~	~	~
[~]	[~]	< __ >	< __ >
~	~	~	~
[~]	X	<__>	<__>
~	~	~	~

ALARMS			
ALARM CONDITION (SEE NOTES)	ALARM PRIORITY	M&C ROUTING NAME	BLDG ROUTING REQ'D
~		~	~
~		~	~
~		~	~
[~]		[~]	[~]
* CWS-P MORE THAN 25% ABOVE OR BELOW CWS-P-SP		[ ]	[~]
~	~	~	~
~	~	~	~

- Notes:
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  - 5) UNIT STATUS: SERVES AS A MONITORED POINT AT THE M&C SOFTWARE (FRONT-END) AND AS A HEATING/COOLING REQUEST TO THE BOILER, HEAT EXCHANGER, AND/OR CHILLER SERVING THIS SYSTEM.

## **APPENDIX FF**

# **Individual Building Mass Notification (IBMNS)/ Personal Alerting System (PAS)**

# **INDIVIDUAL BUILDING MASS NOTIFICATION (IBMNS)/PERSONNEL ALERTING SYSTEMS (PAS) SPECIFICATIONS AND INSTALLATION GUIDELINES**

## **1.0 INTRODUCTION**

The Individual Building Mass Notification System (IBMNS) / Personnel Alerting System (PAS) is a mass notification system with public address and visual alert capabilities. The Installation's I2MC/911 Center will have the ability to activate the buildings IBMNS/PAS mass notification system and provide real-time information to all building occupants or personnel in the immediate vicinity of the building during emergency situations. MNS is a construction requirement for all new inhabited buildings as outlined in the UFC 4-021-01, par 1-6.1

### **1.1 GENERAL REQUIREMENTS (UFC 4-021-01, chap 4)**

- **UFC COMPLIANCE** – IBMNS/PAS must be fully compliant with Unified Facility Criteria UFC 4-021-01. Live voice, pre-recorded messages and visual alerts are required for existing inhabited buildings, primary gathering locations and billeting locations
- IBMNS/PAS must be capable of interfacing to a Telephone Alerting Systems (TASs), as well as existing fire alarm and public address systems where appropriate and required.
- IBMNS/PAS must be part of an integrated indoor/outdoor solution, controlled by the same control point or points
- IBMNS/PAS must be modular in design, allowing system flexibility and scalability.

## **2.0 EQUIPMENT SPECIFICATIONS (every building's application and installation will be different and must be sized per the intent of the UFC)**

### **2.1 REMOTE TERMINAL UNIT (RTU) (activation point)**

#### **2.1.1 FEATURES**

##### **2.1.1.1 AMPLIFIERS**

Amplifiers must be hot swappable from front panel for ease of maintenance

RTU must be capable of regulating sound output levels individually via remote control point(s), allowing remote optimization of alerts and notifications.

### **2.1.1.2 COMMUNICATIONS**

RTU must be capable of either radio and/or landline control.

Communications format must include 128-bit encryption for security.

### **2.1.1.3 DIGITAL VOICE STORAGE (UFC 4-021-01, par 2-2.2.1)**

RTU must be capable of storing up to 16 digitally stored messages for a total of 8 minutes of pre-recorded messages.

### **2.1.1.4. SIGNAL ALERTING FORMATS**

RTU must be capable of a mixture of voice & tone signaling, with a minimum of 7 preprogrammed warning tones.

### **2.1.1.5. DYNAMIC OVER-THE-AIR (OR LANDLINE) REPROGRAMMING**

At least 25% of the available signal duration capacity must be reprogrammable from the control point(s), with the ability to resend message multiple times and overwrite with new message as necessary.

### **2.1.1.6 PROGRAMMING SOFTWARE**

RTU must be capable of reprogramming with easy-to-use Microsoft Windows-based programming software.

## **2.1.2 POWER REQUIREMENTS**

Input voltage:	120 or 240 VAC +/- 10% 50-60 Hz 1 Phase
Input current:	5A AC, 45A DC Maximum
Battery Input Voltage:	21.5 – 30 VDC (24 VDC Nominal)
Operating Voltage:	24 VDC
Standby Time:	> 3 Days with 5 minute full signal reserve
Continuous Signaling Time:	Minimum of 30 minutes

## **2.1.3 CONTROLLER REQUIREMENTS**

Inputs: Minimum of 8 remote inputs, 8 sensor inputs and 4 direction sensor inputs

Outputs: 12 Audio outputs per amplifier

Signal Duration: At least three minutes, with auto reset

Local Microphone Input Impedance:	10 KOhms
Audio Distortion	< 1% Total Harmonic Distortion
Maximum Load Impedance:	600 Ohms
Audio Output Voltage:	.25 to 2.0 Volts P-P @ 600 Ohms
Audio Input Voltage:	.10 to 2.0 Volts P-P @ 600 Ohms
Contact Closure	Minimum of 500 ms. < 1.0 KOhms
Relay Output:	30 VDC, 15 A

#### 2.1.4 TELECOMMUNICATIONS SIGNAL FORMATS

Digital:	Minimal Shift Keying (MSK)
DTMF:	3 – 12 digits
Remote Activation Inputs:	Minimum of 8

#### 2.1.5 AMPLIFIER MODULE

Frequency response:	+/- 3 dB 300 – 3000 Hz (Reference 1 KHz)
Output Voltage to Speaker Drivers:	70 VRms (nominal) 25 VRms (optional)
Input Impedance (per amplifier):	100 KOhms
Power Output (per amplifier)	Minimum of 400 Watts each

#### 2.1.6 GENERAL

Operating Temperature:	-30 to +65 Degrees Celsius
Dimensions (HWD):	32" x 18" x 14" maximum
Enclosure:	NEMA 1 (Lockable)

#### 2.1.7 MONITORING (UFC 4-021-01, par 4-2.1.4)

Two-way diagnostics status monitoring of system, diagnostics must provide Information on. (at a minimum):

- AC Power
- Charger Operation
- Battery Voltage
- Activation Current
- Amplifier voltage and current (per amplifier)
- Quiet Test (Inclusive of Speakers and Amplifiers)
- Local Activation
- Intrusion

W912HN-09-R-XXXX  
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- **Line Supervision**

**2.2 PERIPHERALS (speakers, strobe lights, etc)****2.2.1 POWER REQUIREMENTS**

Peripherals must be powered by the RTU, not locally at peripheral device.  
Power distribution must be low voltage, plenum rated class II wiring.

**2.3 SPEAKERS (UFC 4-021-01, par 2-3.1.2)**

Speaker volume must be locally adjustable with taps or hidden volume controls not readily accessible to building inhabitants (system volume must also be remotely optimizable via software at control point(s)). Speaker locations and placement will be in such a manner as to provide intelligible instruction.

Acceptable speakers include:

**Federal Signal – AudioMaster**

Model	Wattage	Output in dB(C) @ 10'	TYPE
AM-50	2	87	Unamplified, Wall Mounted
AM-300	15	110	Unamplified reentrant trumpet, wall mounted
AM-302	30	114	Unamplified reentrant Trumpet, wall mounted

**Federal Signal – Selectone**

Model	Wattage	Output in dB(C) @ 10'	Type
50GC	2	88	Amplified w/gain Control, wall mounted
300GC	15	110	Amplified reentrant trumpet w/gain control, wall mounted
302GC	30	114	Amplified reentrant Trumpet w/gain control, Wall mounted



**Penton**

Model	Wattage	Output in dB(C) @ 10'	Type
RCS6XT72	.25 – 8	94	8" Ceiling mounted, tappable
CELL10T	1.25 – 10	85	Directional Wall Mounted, tappable
CELLBD10T	2.5 – 20	85	Bidirectional wall mounted, tappable
LIS8+XT72	.25 – 8	86	Lay-in Ceiling tile (PP) speaker tappable
PCB6T72	.25 – 5	84	Low profile surface mount, tappable
PH10	10	92	Amplified horn, wall mounted
PH20	20	95	Amplified horn, wall mounted
PH30	30	97	Amplified horn, wall mounted

**2.4 STROBE LIGHTS (OPTIONAL) (UFC 4-021-01, par 4-2.1.1)**

Strobe lights should meet the intent of the UFC. The domes will be (AMBER) in color, mounted to the ceiling on the interior side or the interior wall. The strobe lights are intended to get the building occupants attention to listen to further verbal instructions. IBMNS/PAS strobes are not intended to evacuate the building. Strobe lights need to be distinct and different from Fire Protection Systems strobes when possible.

Acceptable strobes include:

**Federal Signal**

Model	Peak Candlepower	Type
LP3 (A,G,R,C,B)	175,000      2.2 joules	Drop ceiling, Low-Profile 65-95 FR per min. (PP) ECP@ 51.5
FB24STHI-024C (ADA)	1,000,000	Supervised hearing Impaired strobe

NOTE: The marking (PP) denotes items used in Pilot Program testing.

### **3.0 INSTALLATION GUIDELINES (every building's application and installation will be different and must be sized per the intent of the UFC)**

#### **3.1 RTU LOCATION & POWER REQUIREMENTS**

RTU should be centrally located on the ground floor of building.  
RTU should be located in a controlled (locked) space inside a NEMA 1 enclosure  
RTU must have a dedicated 120 VAC 20A circuit with separate breaker.

Multiple indoor RTUs or outdoor RTUs should be considered for large buildings with audio power requirements exceeding 800 watts

#### **3.2 PERIPHERAL QUANTITIES AND PLACEMENT**

Peripheral alerting devices should of sufficient quantities and placement to supply adequate sound (speakers) and visual (strobes) indoor coverage to: Corridors, Hallways, Primary Gathering locations, Conference Rooms, Large Admin Areas, Large Work Areas (Hangers, Warehouses)

##### **3.2.1 INDOOR SOUND COVERAGE (UFC 4-021-01, par 2-3.1.2)**

Speakers will provide intelligible (NFPA 72) instruction and measured in accordance with International Electrochemical Commission (IEC 60849)

Consideration for placement and speaker type must be given to:

Building size and usage

Ambient noise levels

Utilize higher output speakers (15, 30, or 100 Watts) to overcome high ambient noise

Building Construction:

Block Walls vs. Drywall Partition

Block walls attenuate sound more than drywall partitions

Slab on Deck vs. Metal/Wood Joist Floors

Floor penetrations are required to distribute speaker and strobe wiring floor-to-floor.

Wood Framed vs. Block & Brick

One exterior wall penetration required for each RTU for coaxial cable to antenna mounted on exterior wall.

**Drop Ceiling vs. Sheetrock Ceilings**

For "drop" tile ceilings, use "Lay In" Speakers

Drop ceilings allow use of plenum rated class II wiring without conduits

**3.2.2 VISUAL COVERAGE (UFC 4-021-01, par 4-2.1.1)**

Utilize 1 strobe light approx every 60 feet, and 1 strobe light at each RTU location. The RTU should be start point for strobe placement.

Taking into consideration ADA personnel for location placement, candlepower, joules and ECP.

Placement in Hallways and Corridor coverage should suffice unless large office areas break rooms, and conference rooms exist.

**3.3 INTERFACE TO EXISTING SYSTEMS (UFC 4-021-01, par 2-4.1.2)****3.3.1 PUBLIC ADDRESS SYSTEMS (UFC 4-021-01, par 2-4.1.2)**

Limit interface to existing systems that have been recently installed as recently as 5 years or less. PA system must meet or exceed required specifications.

Do not interface to existing PA systems that are not always on.

As a general rule, try to avoid interfacing existing PA systems unless absolutely required.

**3.3.2 FIRE ALARM PANELS (UFC 4-021-01, par 4-2.1.6)**

IBMNS/PAS will interface with existing fire alarm panels; the interface will temporarily deactivate the building fire alarm system's audible notification appliances. The UFC authorizes this deviation from the NFPA 72

# **APPENDIX GG**

## **Vehicle List**

## CatCode 852 10, Organizational Vehicle Parking, Surfaced

<b>The Army's Facility Planning System (FPS)</b> *** Allowances in Peacetime Criteria ***		1/6/2010 09:05:56ET Location: CONUS
Project Name: 64342 BTB BRagg Prepared By: Brinson	12-MAR-2008 OTOE DATA	
Composite Identification: 64342 BTB		

**Category Code:** 85210 Parking Area, Organizational Vehicles

**FPS CatCode Group:** VM Vehicle Support Group

**Allowance:** Initial value: 24834 SY

**Description:**

This facility consists of a prepared, surfaced area with either bitumen, concrete, paving block, cobblestones, or gravel/tar treatment used for parking TOE/SRC unit and TDA organization military (wheeled, tracked), commercial vehicles trailers and generators, which is normally located as part of, or in proximity to, the maintenance complex. It includes: parking spaces, access lanes and circulation lanes within the hardstand, or associated with the vehicle maintenance area and also includes all paving associated with the vehicle storage sheds (category code 44262). Parking covered only with gravel is considered unsurfaced (85211). Areas for privately owned vehicles (POV), or non-organizational vehicles are under category code 85215. This facility includes aprons and circulation lanes associated with each of the facilities located in the maintenance complexes, to include:

<b>Category Code</b>	<b>Description</b>
12311	Land Vehicle Fueling Facility, MOGAS
12322	Land Vehicle Fueling Facility, Diesel
14165	Fueling/POL Support Building
21410	Vehicle Maintenance Shop
21470	Oil Storage Building
21885	Maintenance Shop, General Purpose
21910	Engineering/Housing Maintenance Shop
44224	Organizational Storage Building
44262	Vehicle Storage Shed

**Criteria:**

The total pavement allowance under this category code is dependent on the type and size of facilities included in the maintenance complex; the parking area allowance is based on the quantity and size of organizational vehicles authorized (normally at strength level 1), to include the circulation aisle(s). The parking configuration utilized for calculation of the area needed is as follows:

1. Parking stalls are placed back-to-back with access lane widths of 30 feet for vehicles less than or equal to 18 feet long and 45 feet for vehicles more than 18 feet long.
2. All circulation lane widths are 30 feet.
3. Trailers other than semitrailers are usually parked with their prime movers.
4. Side clearances for parking of vehicles are 3 linear feet. End clearances are 2 linear feet.
5. Unit integrity of parked vehicles is maintained where possible. However, partially filled parking rows will be filled by vehicles from the next organization.
6. POL vehicles are parked in a physically separated area in rows 50 feet apart, with a 10-foot clearance between vehicles.
7. When vehicle storage sheds (category code 44262) are authorized, combat vehicles are parked at the rate of 16 vehicles per shed. Sheds measure 95 feet by 148 feet and are spaced 82 feet apart along the side and 33 feet apart at the end.
8. For category codes:
 

21410	Tactical Equipment Maintenance Facility (TEMF)
21885	Maintenance Shop, General Purpose
21910	DPW Maintenance Shop

The total area provided for these facilities includes facility aprons measuring 45 feet on all four sides of the facility. Additionally, a 20 foot wide circulation lane is provided on all four sides of the facility.

## 9. For category code 21470 - Oil Storage Building:

The pavement associated with this building consists of apron only, as it is assumed to be sited adjacent to a circulation

## CatCode 852 10, Organizational Vehicle Parking, Surfaced

lane which is accounted for by other facilities. The apron area extends along the entire building length on one side. By using an assumed building length of 20 feet, and a fixed apron depth of 27 feet, each facility is assigned 84 square yards. Because this allowance is generally quite small, it is ignored in the computation below

10. For category code 44224 - Organizational Storage Building

The pavement associated with this building consists of apron only, since the building is assumed to be sited adjacent to a circulation lane which is accounted for by other facilities. The apron area extends along the entire building length on one side. The computation used in the FPS assumes a building width of 25 feet, and a fixed apron depth of 27 feet

11. For category code 44262 - Vehicle Storage Sheds:

See the Basis of Calculation section below.

**References:**

Army Criteria Tracking System (ACTS)	28 Dec 2006
TI 800-01, Chapter 4	18 Mar 2002
DA PAM 415-28, Guide to Army Real Property Category Codes	11 Apr 2006
UFC 4-214-02, Tactical Equipment Maintenance Facility (TEMF) Standard Design	5 Oct 2007

**Basis of Calculation:**

The paved areas included under this category code consist of vehicle parking areas as well as the aprons and circulation lanes associated with each of the facilities located in a maintenance complex. The total pavement allowance is based on the type and size of the vehicles and facilities.

The parking allowances are based on the number and size of organizational vehicles authorized (usually at strength level 1). The initial step is to identify and separate these vehicles according to their parking needs. The calculation of hardstand pavement allowances is based on back-to-back parking stalls with access lane widths of 30 feet for vehicles less than or equal to 18 feet long and 45 feet for vehicles greater than 18 feet long. (For POL vehicles, see POL Vehicle Parking below.)

The Trigger/Counter (T/C) codes are as follows:

- A - Trucks, 5/4 ton or less
- B - Trucks, 2-1/2 ton
- C - Trucks, 5 ton
- D - Trucks, 8-ton and greater
- E - Trucks, Tractor
- F - Trucks, 2-1/2 ton, can haul TPUs
- G - Trucks, 5-ton, can haul TPU's
- J - Trailers towed by Truck Class A
- K - Trailers towed by Truck Class B
- L - Trailers towed by Truck Class C
- M - Trailers towed by Truck Class D
- N - Semitrailers
- P - POL Tank Trucks
- Q - TPUs and Trailer-mounted Fuel Tanks
- S - POL Semitrailers
- T - Tracked Vehicles
- V - Class IX Supply Trailers (to be parked adjacent to warehouse)
- W - Trailers towed by Truck Class A, can haul TPU's
- X - Vehicles/Equipment which do not pull trailers
- Y - Trailers towed by Truck Class B, can haul TPUs
- Z - Trailers towed by Truck Class C, can haul TPU's

The vehicles and trailers with their length and width dimensions are identified by equipment Line Item Number (LIN). The POL (Petroleum, Oil and Lubricant) vehicles, including Tank and Pump Units (TPUs), and trailer-mounted tank units, are separated, and five-ton trucks and 1-1/2-ton trailers are allocated to transport the TPUs and the trailer mounted tank units. Class IX vehicles are also identified and separated, as they will be parked on the apron areas adjoining the warehouse and DS maintenance shop, and are not allowed additional hardstand. Other vehicles separated are the combat vehicles designated for parking in the vehicle storage sheds (category code 44262), which are authorized for Europe and Korea only. Subsequent to the identification of all vehicles, the trailers are matched with trucks by company, based on weight classifications.

The space allowance for parking the vehicles is based on a standardized layout conforming to the above criteria. Constant site width for each of the unique conditions was established based on a standard layout for the site structures. The parking stalls are then plotted mathematically, starting with the longest vehicle or vehicle/trailer combination in the first organization in the user's list, continuing through each organization, and going alternately from shortest to longest and longest to shortest vehicles.

The longest vehicle or vehicle combination in each row establishes the row width and the width of the access lane. Circulation lanes 30 feet wide extend along both sides of the hardstand

For a facility located in Alaska, a 30 foot stabilized area for snow storage is authorized around the perimeter of the parking area. This area is not included in the FPS calculations.

**POL Vehicle Parking**

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The POL vehicle parking area is presumed to be physically separated from the regular vehicle hardstand and is calculated separately. POL Semitrailers with tractor are allowed a 19-foot by 55-foot space with a 50-foot access lane. Other POL vehicles are assigned a 19-foot by 40-foot space with a 50-foot access lane. The computer program matches tractors and semitrailers to other POL Truck-trailer combinations prior to calculating space allowances.

**Vehicle Storage Sheds**

When authorized, Vehicle Storage Sheds (category code 44262) are used for parking up-loaded combat vehicles. The aprons and side clearance areas for these sheds are included with category code 85210. The vehicles utilized to quantify category code 44262 are subtracted prior to the computation of the following algorithms, which conform to the criteria provided

Single Full Shed                    1997.4 SY/ea.  
Single Half-Shed                    1823.3 SY/ea.

Aprons for Vehicle Storage Sheds are not shared.

The following equations develop the areas above:

Single Full Shed  
 $((\text{SWID} + 33\text{FT}) (\text{SLNH} + 82 \text{ FT}) - (\text{SWID} \times \text{SLNH})) / 9$

Single Half-Shed  
 $((\text{SWID} + 33 \text{ SF}) (1/2 \text{ SLNH} + 82 \text{ FT}) - (\text{SWID} \times 1/2 \text{ SLNH})) / 9$

Where:

SWID = SHED WIDTH = 148 FT

SLNH = SHED LENGTH = 95 FT

**Summary**

The number of tactical vehicles and major equipment items in the planning base for organizational parking (category code 85210) plus the number of combat vehicles, radars, and major weapons systems in the planning base for vehicle storage sheds (category code 44262) equals the total number of major pieces of equipment for which space is provided in the maintenance complex. This is not equal to the total number of parking spaces, due to factors such as vehicle storage sheds in Europe and Korea, the pairing of trucks and trailers in single parking spaces based on pavement usage optimization, the diversion of Class IX storage vans to the area around the maintenance shop where they are more easily accessed by maintenance personnel, the mounting of TPU's on trucks or trailers, etc.

**Planning Base:**

Type, Size, and Number of Organizational Vehicles

**Equipment Triggers and Counters:**

77405G100 6 BDE TRP BN, ABN (IBCT)

77406G200 6 HHC, BRIGADE SPECIAL TRO

<u>LIN</u>	<u>LIN Description</u>	<u>Paragraph</u>	<u>Length (Inches)</u>	<u>Width (Inches)</u>	<u>T/C Code</u>	<u>Quantity</u>
Z00958	TRK UTILITY COMMAND AND CONTROL IAI	01	194 *	110 *	A	2
Z01013	TRUCK UTILITY: ECV SHELTER/TROOP/CA	01	194 *	110 *	A	1
Z00958	TRK UTILITY COMMAND AND CONTROL IAI	02	194 *	110 *	A	2
T95992	LIGHT TACTICAL TRAILER: 3/4 TON	03	132	86	J	1
Z00958	TRK UTILITY COMMAND AND CONTROL IAI	03	194 *	110 *	A	1
Z01012	POWER PLANT ELECTRIC TRAILER MOUN	03	147 *	84 *	B	1
Z01013	TRUCK UTILITY: ECV SHELTER/TROOP/CA	03	194 *	110 *	A	1
T95992	LIGHT TACTICAL TRAILER: 3/4 TON	04	132	86	J	1
Z01013	TRUCK UTILITY: ECV SHELTER/TROOP/CA	04	194 *	110 *	A	1
T95992	LIGHT TACTICAL TRAILER: 3/4 TON	05	132	86	J	1
Z00958	TRK UTILITY COMMAND AND CONTROL IAI	05	194 *	110 *	A	1
T60081	TRUCK CARGO: 4X4 LMTV W/E	06	255	96	F	1
Z01013	TRUCK UTILITY: ECV SHELTER/TROOP/CA	07	194 *	110 *	A	1
T95992	LIGHT TACTICAL TRAILER: 3/4 TON	08	132	86	J	2
Z01013	TRUCK UTILITY: ECV SHELTER/TROOP/CA	08	194 *	110 *	A	2
D82404	DECONTAMINATING APPARATUS: PWR DF	09	45	24	X	2
T41036	TRUCK CARGO: 5 TON 6X6 MTV W/E LAPE	09	278	96	G	2
T60081	TRUCK CARGO: 4X4 LMTV W/E	09	255	96	F	1
T96564	TRAILER FLAT BED: M1082 TRLR CARGO L	09	210	96	K	1
Z00958	TRK UTILITY COMMAND AND CONTROL IAI	09	194 *	110 *	A	1
Z36683	TRAILER TANK WATER (CAMEL): 800 GAL	09	243 *	98 *	L	1
A93374	ARMORED SECURITY VEHICLE: WHEELED	10	237	101	X	6
T34704	TRUCK UTILITY: ECV ARMAMENT CARRIER	10	197 *	110 *	A	8
T95924	TRAILER CARGO: HIGH MOBILITY 1-1/4 T	10	132	86	KO	7
T34704	TRUCK UTILITY: ECV ARMAMENT CARRIER	11	197 *	110 *	A	2
T34704	TRUCK UTILITY: ECV ARMAMENT CARRIER	12	197 *	110 *	A	2
Z00958	TRK UTILITY COMMAND AND CONTROL IAI	13	194 *	110 *	A	1

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T38844	TRUCK AMBULANCE: 4 LITTER ARMD 4X4	14	205	102	A	2
T95992	LIGHT TACTICAL TRAILER: 3/4 TON	14	132	86	J	1
Z01013	TRUCK UTILITY: ECV SHELTER/TROOP/CA	14	194 *	110 *	A	1
T58161	TRUCK TANK: FUEL SERVICING 2500 GALL	15	401	96	P	2
T59278	TRUCK CARGO: TACTICAL 8X8 HEAVY EXF	15	401	102	D	2
T93761	TRAILER: PALLETIZED LOADING 8X20	15	306	96	M	2
Z01013	TRUCK UTILITY: ECV SHELTER/TROOP/CA	15	194 *	110 *	A	1
G74711	GEN SET: DED SKID MTD 10KW 60HZ	16	62	32	X	1
H00654	HEATER: DUCT TYPE PORTABLE 350K BTU	16	65 *	72 *	J	1
T30377	TOOL OUTFIT HYDRAULIC SYSTEM: TEST	16	180	90	J	1
T41135	TRUCK CARGO: MTV W/E W/W	16	279	96	G	1
T63093	TRUCK WRECKER: TACTICAL 8X8 HEAVY E	16	402	102	D	1
T96564	TRAILER FLAT BED: M1082 TRLR CARGO L	16	210	96	K	1
Z01013	TRUCK UTILITY: ECV SHELTER/TROOP/CA	16	194 *	110 *	A	1
C27633	CONTAINERIZED KITCHEN: CK	17	240	96	X	1
G74711	GEN SET: DED SKID MTD 10KW 60HZ	17	62	32	X	1
T41036	TRUCK CARGO: 5 TON 6X6 MTV W/E LAPE:	17	278	96	G	3
T93761	TRAILER: PALLETIZED LOADING 8X20	17	306	96	M	1
T96496	TRUCK CARGO: TACTICAL 8X8 HEAVY EXF	17	401	96	D	1
Z00206	MULTI-TEMPERATURE REFRIGERATED CC	17	96 *	240 *	X	1
Z36683	TRAILER TANK WATER (CAMEL): 800 GAL E	17	243 *	98 *	L	2

## 05453G100 6 ENGINEER COMPANY, BRIGAD

<u>LIN</u>	<u>LIN Description</u>	<u>Paragraph</u>	<u>Length (Inches)</u>	<u>Width (Inches)</u>	<u>T/C Code</u>	<u>Quantity</u>
G36169	GENERATOR SET DIESEL: 28V DC	01	31	31	X	1
G42238	GEN SET DED TM: 5KW 60HZ MTD ON M11	01	147	84	K	1
T41104	TRUCK CARGO: 5 TON 6X6 MTV W/E W/W L	01	278	96	G	1
Z00958	TRK UTILITY COMMAND AND CONTROL IAI	01	194 *	110 *	A	1
Z01013	TRUCK UTILITY: ECV SHELTER/TROOP/CA	01	194 *	110 *	A	1
Z36683	TRAILER TANK WATER (CAMEL): 800 GAL E	01	243 *	98 *	L	1
T95924	TRAILER CARGO: HIGH MOBILITY 1-1/4 TO	02	132	86	K	2
Z00958	TRK UTILITY COMMAND AND CONTROL IAI	02	194 *	110 *	A	2
Z01013	TRUCK UTILITY: ECV SHELTER/TROOP/CA	02	194 *	110 *	A	2
T95924	TRAILER CARGO: HIGH MOBILITY 1-1/4 TO	03	132	86	K	6
Z01013	TRUCK UTILITY: ECV SHELTER/TROOP/CA	03	194 *	110 *	A	6
S70517	SEMITRAILER LOW BED: 25 TON 4 WHEEL	04	417	115	N	2
T51759	TRACTOR WHEELED: HMEE	04	398	120	X	4
T61239	TRUCK TRACTOR: MTV W/E	04	282	96	E	2
T65594	TRUCK DUMP: 5 TON 6X6 MTV W/E W/W L	04	284	96	C	2
T76541	TRACTOR FULL TRACKED HIGH SPEED: DI	04	230	107	T	2
T95555	TRAILER CARGO: MTV W/DROPSIDES M10	04	232	96	K	1
Z34524	CY MULTI PURPOSE LOADER: LIGHT SCOC	04	297 *	106 *	X	1

## 11307G900 6 SIGNAL NETWORK SPT COMPA

<u>LIN</u>	<u>LIN Description</u>	<u>Paragraph</u>	<u>Length (Inches)</u>	<u>Width (Inches)</u>	<u>T/C Code</u>	<u>Quantity</u>
T41036	TRUCK CARGO: 5 TON 6X6 MTV W/E LAPE:	01	278	96	G	1
T95992	LIGHT TACTICAL TRAILER: 3/4 TON	01	132	86	J	1
W98825	TRAILER TANK: WATER 400 GALLON 1-1/2	01	163	98	K	1
Z00958	TRK UTILITY COMMAND AND CONTROL IAI	01	194 *	110 *	A	2
Z01013	TRUCK UTILITY: ECV SHELTER/TROOP/CA	02	194 *	110 *	A	1
T95992	LIGHT TACTICAL TRAILER: 3/4 TON	03	132	86	J	1
Z01013	TRUCK UTILITY: ECV SHELTER/TROOP/CA	03	194 *	110 *	A	3
G42170	GEN SET DED TM: 10KW 60HZ MTD ONM11	04	147	84	K	1
Z01013	TRUCK UTILITY: ECV SHELTER/TROOP/CA	04	194 *	110 *	A	2
T95992	LIGHT TACTICAL TRAILER: 3/4 TON	05	132	86	J	1
Z01013	TRUCK UTILITY: ECV SHELTER/TROOP/CA	05	194 *	110 *	A	1
T95992	LIGHT TACTICAL TRAILER: 3/4 TON	06	132	86	J	2
Z01013	TRUCK UTILITY: ECV SHELTER/TROOP/CA	06	194 *	110 *	A	2
G42170	GEN SET DED TM: 10KW 60HZ MTD ONM11	07	147	84	K	2
T95924	TRAILER CARGO: HIGH MOBILITY 1-1/4 TO	07	132	86	K	2
Z01013	TRUCK UTILITY: ECV SHELTER/TROOP/CA	07	194 *	110 *	A	10
G42238	GEN SET DED TM: 5KW 60HZ MTD ON M11	08	147	84	K	2
T95992	LIGHT TACTICAL TRAILER: 3/4 TON	08	132	86	J	2
Z01013	TRUCK UTILITY: ECV SHELTER/TROOP/CA	08	194 *	110 *	A	4
Z01013	TRUCK UTILITY: ECV SHELTER/TROOP/CA	09	194 *	110 *	A	2
T95992	LIGHT TACTICAL TRAILER: 3/4 TON	10	132	86	J	2
Z01013	TRUCK UTILITY: ECV SHELTER/TROOP/CA	10	194 *	110 *	A	2
G36237	GENERATOR SET DIESEL: 60HZ AC	11	30	23	X	2
T95992	LIGHT TACTICAL TRAILER: 3/4 TON	11	132	86	J	2
Z01013	TRUCK UTILITY: ECV SHELTER/TROOP/CA	11	194 *	110 *	A	6

## 01708G400 3 UAV PLATOON

Length Width



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<u>LIN</u>	<u>LIN Description</u>	<u>Paragraph</u>	<u>(Inches)</u>	<u>(Inches)</u>	<u>T/C Code</u>	<u>Quantity</u>
Z01013	TRUCK UTILITY: ECV SHELTER/TROOP/CA	01	194 *	110 *	A	1
G36237	GENERATOR SET DIESEL: 60HZ AC	02	30	23	X	1
Z01013	TRUCK UTILITY: ECV SHELTER/TROOP/CA	02	194 *	110 *	A	1
G36237	GENERATOR SET DIESEL: 60HZ AC	03	30	23	X	3
T95924	TRAILER CARGO: HIGH MOBILITY 1-1/4 TO	03	132	86	K	2
Z01013	TRUCK UTILITY: ECV SHELTER/TROOP/CA	03	194 *	110 *	A	4

## 34308G600 6 MI CO, BCT (ABN)

<u>LIN</u>	<u>LIN Description</u>	<u>Paragraph</u>	<u>Length (Inches)</u>	<u>Width (Inches)</u>	<u>T/C Code</u>	<u>Quantity</u>
P42262	POWER PLANT: DIESEL TRL/MTD 10KW60H	01	169	84	K	1
T41036	TRUCK CARGO: 5 TON 6X6 MTV W/E LAPE:	01	278	96	G	1
T95992	LIGHT TACTICAL TRAILER: 3/4 TON	01	132	86	J	1
Z00958	TRK UTILITY COMMAND AND CONTROL IAI	01	194 *	110 *	A	2
Z36683	TRAILER TANK WATER (CAMEL): 800 GAL	01	243 *	98 *	L	1
Z00958	TRK UTILITY COMMAND AND CONTROL IAI	02	194 *	110 *	A	1
G35851	GENERATOR SET DIESEL ENGINE TM: PU-	03	165	95	K	2
G78374	GENERATOR SET: DIESEL ENG TRLR -MT	03	147	85	K	1
T41036	TRUCK CARGO: 5 TON 6X6 MTV W/E LAPE:	03	278	96	G	1
Z01013	TRUCK UTILITY: ECV SHELTER/TROOP/CA	03	194 *	110 *	A	3
T07679	TRUCK UTILITY: HEAVY VARIANT HMMWV	04	191	86	A	1
T41036	TRUCK CARGO: 5 TON 6X6 MTV W/E LAPE:	04	278	96	G	1
T61494	TRUCK UTILITY: CARGO/TROOP CARRIER	04	180	86	A	1
Z01013	TRUCK UTILITY: ECV SHELTER/TROOP/CA	04	194 *	110 *	A	2
T95924	TRAILER CARGO: HIGH MOBILITY 1-1/4 TO	05	132	86	K	1
Z01013	TRUCK UTILITY: ECV SHELTER/TROOP/CA	05	194 *	110 *	A	2
G74711	GEN SET: DED SKID MTD 10KW 60HZ	06	62	32	X	2
T61630	TRUCK UTILITY: EXPANDED CAPACITY 4X4	06	197	86	A	1
T95924	TRAILER CARGO: HIGH MOBILITY 1-1/4 TO	06	132	86	K	2
Z01013	TRUCK UTILITY: ECV SHELTER/TROOP/CA	06	194 *	110 *	A	2
T95992	LIGHT TACTICAL TRAILER: 3/4 TON	07	132	86	J	1
Z01013	TRUCK UTILITY: ECV SHELTER/TROOP/CA	07	194 *	110 *	A	1
T34704	TRUCK UTILITY: ECV ARMAMENT CARRIER	08	197 *	110 *	A	6
Z01013	TRUCK UTILITY: ECV SHELTER/TROOP/CA	09	194 *	110 *	A	3
T95924	TRAILER CARGO: HIGH MOBILITY 1-1/4 TO	10	132	86	K	1
Z00958	TRK UTILITY COMMAND AND CONTROL IAI	10	194 *	110 *	A	1
T95924	TRAILER CARGO: HIGH MOBILITY 1-1/4 TO	11	132	86	K	1
Z00958	TRK UTILITY COMMAND AND CONTROL IAI	11	194 *	110 *	A	1
T95924	TRAILER CARGO: HIGH MOBILITY 1-1/4 TO	12	132	86	K	1
Z00958	TRK UTILITY COMMAND AND CONTROL IAI	12	194 *	110 *	A	2
H01907	ELECTRONIC SHOP SHELTER MOUNTED A	13	159	94	X	1
H01912	ELECTRONIC SHOP SHELTER MOUNTED A	13	160	95	X	1
P42262	POWER PLANT: DIESEL TRL/MTD 10KW60H	13	169	84	K	2
T41036	TRUCK CARGO: 5 TON 6X6 MTV W/E LAPE:	13	278	96	G	1
T41995	TRUCK CARGO: 2 1/2 TON 4X4 LMTV W/E L	13	255	96	F	1
T95992	LIGHT TACTICAL TRAILER: 3/4 TON	13	132	86	J	1
Z01013	TRUCK UTILITY: ECV SHELTER/TROOP/CA	13	194 *	110 *	A	3

Total Vehicles

245

\* Estimated value

Unit of Measure:  
SY

## Trucks Assigned to Parking Area:

<u>T/C Code</u>	<u>LIN</u>	<u>Length (Feet)</u>	<u>Width (Feet)</u>	<u>Quantity</u>
A	Z00958	16	9	2
A	Z01013	16	9	1
A	Z00958	16	9	2
A	Z00958	16	9	1
B	Z01012	12	7	1
A	Z01013	16	9	1
A	Z01013	16	9	1
A	Z00958	16	9	1
F	T60081	21	8	1
A	Z01013	16	9	1
A	Z01013	16	9	2
X	D82404	4	2	2
G	T41036	23	8	2
F	T60081	21	8	1
A	Z00958	16	9	1

## CatCode 852 10, Organizational Vehicle Parking, Surfaced

X	A93374	20	8	6
A	T34704	16	9	8
A	T34704	16	9	2
A	T34704	16	9	2
A	Z00958	16	9	1
A	T38844	17	9	2
A	Z01013	16	9	1
D	T59278	33	9	2
A	Z01013	16	9	1
X	G74711	5	3	1
G	T41135	23	8	1
D	T63093	34	9	1
A	Z01013	16	9	1
X	C27633	20	8	1
X	G74711	5	3	1
G	T41036	23	8	3
D	T96496	33	8	1
X	Z00206	8	20	1
X	G36169	3	3	1
G	T41104	23	8	1
A	Z00958	16	9	1
A	Z01013	16	9	1
A	Z00958	16	9	2
A	Z01013	16	9	2
A	Z01013	16	9	6
X	T51759	33	10	4
E	T61239	24	8	2
C	T65594	24	8	2
T	T76541	19	9	2
X	Z34524	25	9	1
G	T41036	23	8	1
A	Z00958	16	9	2
A	Z01013	16	9	1
A	Z01013	16	9	3
A	Z01013	16	9	2
A	Z01013	16	9	1
A	Z01013	16	9	2
A	Z01013	16	9	10
A	Z01013	16	9	4
A	Z01013	16	9	2
A	Z01013	16	9	2
X	G36237	3	2	2
A	Z01013	16	9	6
A	Z01013	16	9	1
X	G36237	3	2	1
A	Z01013	16	9	1
X	G36237	3	2	3
A	Z01013	16	9	4
G	T41036	23	8	1
A	Z00958	16	9	2
A	Z00958	16	9	1
G	T41036	23	8	1
A	Z01013	16	9	3
A	T07679	16	7	1
G	T41036	23	8	1
A	T61494	15	7	1
A	Z01013	16	9	2
A	Z01013	16	9	2
X	G74711	5	3	2
A	T61630	16	7	1
A	Z01013	16	9	2
A	Z01013	16	9	1
A	T34704	16	9	6
A	Z01013	16	9	3
A	Z00958	16	9	1
A	Z00958	16	9	1
A	Z00958	16	9	2
X	H01907	13	8	1
X	H01912	13	8	1
G	T41036	23	8	1
F	T41995	21	8	1
A	Z01013	16	9	3

Total Trucks

170

## CatCode 852 10, Organizational Vehicle Parking, Surfaced

## Trailers Assigned to Parking Area:

<u>T/C Code</u>	<u>LIN</u>	<u>Length (Feet)</u>	<u>Width (Feet)</u>	<u>Quantity</u>
J	T95992	11	7	1
J	T95992	11	7	1
J	T95992	11	7	1
J	T95992	11	7	2
K	T96564	18	8	1
L	Z36683	20	8	1
K	T95924	11	7	7
J	T95992	11	7	1
M	T93761	26	8	2
J	H00654	5	6	1
J	T30377	15	8	1
K	T96564	18	8	1
M	T93761	26	8	1
L	Z36683	20	8	2
K	G42238	12	7	1
L	Z36683	20	8	1
K	T95924	11	7	2
K	T95924	11	7	6
N	S70517	35	10	2
K	T95555	19	8	1
J	T95992	11	7	1
K	W98825	14	8	1
J	T95992	11	7	1
K	G42170	12	7	1
J	T95992	11	7	1
J	T95992	11	7	2
K	G42170	12	7	2
K	T95924	11	7	2
K	G42238	12	7	2
J	T95992	11	7	2
J	T95992	11	7	2
J	T95992	11	7	2
K	T95924	11	7	2
K	P42262	14	7	1
J	T95992	11	7	1
L	Z36683	20	8	1
K	G35851	14	8	2
K	G78374	12	7	1
K	T95924	11	7	1
K	T95924	11	7	2
J	T95992	11	7	1
K	T95924	11	7	1
K	T95924	11	7	1
K	T95924	11	7	1
K	P42262	14	7	2
J	T95992	11	7	1
<b>Total Trailers</b>				<b>73</b>

## Parking Layout Details:

2 POL Trucks are present in this unit.

No POL Semitrailers are present in this unit.

No truck or trailer mounted Tank & Pump Units are present in this unit.

These units and the trucks (T/C codes F & G) and trailers (T/C codes W, Y, & Z) used to carry them will be parked in the POL vehicle area.

## POL Parking Area

<u>Row #</u>	<u>Spaces</u>	<u># Circulation Lanes</u>	<u>Length (Feet)</u>	<u>Max Space Length (Feet)</u>
1	2	2	78	40

The number of tactical vehicles and major equipment in the planning base for organizational parking (category code 85210) plus the number of combat vehicles, radars, and major weapons systems in the planning base for vehicle storage sheds (category code 44262) equals the total number of major pieces of equipment for which space is provided in the maintenance complex. This is not equal to the total number of parking spaces, due to factors such as vehicle storage sheds in Europe and Korea, the pairing of trucks and trailers in single parking spaces based on pavement optimization, the diversion of Class 1X storage vans to the area around the shop where they are easily accessible by

## CatCode 852 10, Organizational Vehicle Parking, Surfaced

maintenance personnel, and the mounting of TPUs on trucks or trailers, etc.

## Parking Rows

Row #	Spaces	Length (Feet)	Max Space Length (Feet)
1	25	345	36
2	24	339	22
3	28	349	18
4	25	345	26
5	23	341	37
6	24	341	18
7	29	348	29
8	24	348	18
9	19	246	18

## Access Lanes

Lane #	Lane Width (Feet)
1	45
2	45
3	45
4	45
5	30

## Parking Area Layout

Truck T/C Code	Trailer T/C Code	Truck LIN	Trailer LIN	Space Length (Feet)	Space Width (Feet)	Number of Spaces
----- Row 1 -----						
D		T63093		36	12	1
D		T59278		35	12	1
D		T59278		35	12	1
D		T96496		35	11	1
A	J	Z01013	T30377	33	12	1
G	J	T41135	H00654	31	11	1
A	J	Z00958	T95992	29	12	1
A	J	Z01013	T95992	29	12	1
A	J	Z01013	T95992	29	12	1
A	J	Z00958	T95992	29	12	1
A	J	Z01013	T95992	29	12	1
A	J	Z01013	T95992	29	12	1
	M		T93761	28	11	1
	M		T93761	28	11	1
	M		T93761	28	11	1
G		T41036		25	11	1
G		T41036		25	11	1
G		T41036		25	11	1
G		T41036		25	11	1
G		T41036		25	11	1
F		T60081		23	11	1
F		T60081		23	11	1
X		A93374		22	11	1
X		A93374		22	11	1
X		A93374		22	11	1
----- Row 2 -----						
X		A93374		22	11	1
X		A93374		22	11	1
	L		Z36683	22	11	1
	L		Z36683	22	11	1
X		A93374		22	11	1
	L		Z36683	22	11	1
X		C27633		22	11	1
	K		T96564	20	11	1
	K		T96564	20	11	1
A		T38844		19	12	1
A		T38844		19	12	1
A		Z00958		18	12	1
A		T34704		18	12	1
A		Z00958		18	12	1
A		T34704		18	12	1
A		T34704		18	12	1
A		T34704		18	12	1
A		T34704		18	12	1

## CatCode 852 10, Organizational Vehicle Parking, Surfaced

A		T34704		18	12	1
A		T34704		18	12	1
A		Z01013		18	12	1
A		T34704		18	12	1
A		T34704		18	12	1
A		Z00958		18	12	1
----- Row 3 -----						
A		T34704		18	12	1
A		Z01013		18	12	1
A		Z01013		18	12	1
A		Z00958		18	12	1
A		Z00958		18	12	1
A		Z01013		18	12	1
A		Z00958		18	12	1
A		T34704		18	12	1
A		T34704		18	12	1
B		Z01012		14	10	1
	K		T95924	13	10	1
	K		T95924	13	10	1
	K		T95924	13	10	1
	K		T95924	13	10	1
	K		T95924	13	10	1
	K		T95924	13	10	1
	K		T95924	13	10	1
X		Z00206		10	23	1
X		G74711		7	6	1
X		G74711		7	6	1
X		D82404		6	5	1
X		D82404		6	5	1
X		G36169		5	6	1
	K		T95924	13	10	1
	K		T95924	13	10	1
	K		T95924	13	10	1
	K		T95924	13	10	1
	K		T95924	13	10	1
----- Row 4 -----						
	K		T95924	13	10	1
	K		T95924	13	10	1
	K		T95924	13	10	1
	K		G42238	14	10	1
A		Z01013		18	12	1
A		Z01013		18	12	1
A		Z01013		18	12	1
A		Z01013		18	12	1
A		Z01013		18	12	1
A		Z01013		18	12	1
A		Z01013		18	12	1
A		Z00958		18	12	1
A		Z00958		18	12	1
A		Z01013		18	12	1
A		Z01013		18	12	1
A		Z00958		18	12	1
	K		T95555	21	11	1
T		T76541		21	12	1
T		T76541		21	12	1
	L		Z36683	22	11	1
G		T41104		25	11	1
E		T61239		26	11	1
C		T65594		26	11	1
C		T65594		26	11	1
E		T61239		26	11	1
----- Row 5 -----						
X		Z34524		27	12	1
X		T51759		35	13	1
X		T51759		35	13	1
X		T51759		35	13	1
X		T51759		35	13	1
	N		S70517	37	13	1
	N		S70517	37	13	1
A	J	Z01013	T95992	29	12	1
A	J	Z00958	T95992	29	12	1
A	J	Z01013	T95992	29	12	1

## CatCode 852 10, Organizational Vehicle Parking, Surfaced

A	J	Z01013	T95992	29	12	1
A	J	Z01013	T95992	29	12	1
A	J	Z01013	T95992	29	12	1
A	J	Z01013	T95992	29	12	1
A	J	Z01013	T95992	29	12	1
A	J	Z01013	T95992	29	12	1
A	J	Z01013	T95992	29	12	1
G		T41036		25	11	1
A		Z01013		18	12	1
A		Z01013		18	12	1
A		Z01013		18	12	1
A		Z01013		18	12	1
A		Z01013		18	12	1

----- Row 6 -----

A		Z01013		18	12	1
A		Z01013		18	12	1
A		Z01013		18	12	1
A		Z01013		18	12	1
A		Z01013		18	12	1
A		Z01013		18	12	1
A		Z01013		18	12	1
A		Z01013		18	12	1
A		Z01013		18	12	1
A		Z01013		18	12	1
A		Z01013		18	12	1
A		Z01013		18	12	1
A		Z01013		18	12	1
A		Z01013		18	12	1
A		Z01013		18	12	1
A		Z01013		18	12	1
A		Z01013		18	12	1
A		Z01013		18	12	1
A		Z01013		18	12	1
A		Z01013		18	12	1
	K		W98825	16	11	1
	K		G42170	14	10	1
	K		G42238	14	10	1
	K		G42170	14	10	1

----- Row 7 -----

	K		G42170	14	10	1
	K		G42238	14	10	1
	K		T95924	13	10	1
	K		T95924	13	10	1
X		G36237		5	5	1
X		G36237		5	5	1
X		G36237		5	5	1
X		G36237		5	5	1
X		G36237		5	5	1
X		G36237		5	5	1
	K		T95924	13	10	1
	K		T95924	13	10	1
A		Z01013		18	12	1
A		Z01013		18	12	1
A		Z01013		18	12	1
A		Z01013		18	12	1
A		Z01013		18	12	1
A		Z01013		18	12	1
A	J	Z01013	T95992	29	12	1
A	J	Z00958	T95992	29	12	1
A	J	Z01013	T95992	29	12	1
G		T41036		25	11	1
G		T41036		25	11	1
G		T41036		25	11	1
G		T41036		25	11	1
F		T41995		23	11	1
	L		Z36683	22	11	1
A		Z01013		18	12	1
A		Z01013		18	12	1

----- Row 8 -----

A		Z01013		18	12	1
A		Z01013		18	12	1
A		Z01013		18	12	1

CatCode 852 10, Organizational Vehicle Parking, Surfaced

A		Z01013		18	12	1
A		Z00958		18	12	1
A		Z00958		18	12	1
A		Z01013		18	12	1
A		Z01013		18	12	1
A		Z01013		18	12	1
A		Z01013		18	12	1
A		T34704		18	12	1
A		T34704		18	12	1
A		T34704		18	12	1
A		T34704		18	12	1
A		T34704		18	12	1
A		T34704		18	12	1
A		Z01013		18	12	1
A		Z01013		18	12	1
A		Z01013		18	12	1
A		Z00958		18	12	1
A		Z00958		18	12	1
A		Z00958		18	12	1
A		Z01013		18	12	1

Row 9

A		T61630		18	10	1
A		T07679		18	10	1
A		T61494		17	10	1
	K		G35851	16	11	1
	K		G35851	16	11	1
	K		P42262	16	10	1
	K		P42262	16	10	1
	K		P42262	16	10	1
X		H01907		15	11	1
X		H01912		15	11	1
	K		G78374	14	10	1
	K		T95924	13	10	1
	K		T95924	13	10	1
	K		T95924	13	10	1
	K		T95924	13	10	1
	K		T95924	13	10	1
	K		T95924	13	10	1
X		G74711		7	6	1
X		G74711		7	6	1

Parking Area, Organizational Vehicles Allowance:

Allowance = 24834 SY

Based On:

Variable Name	Initial Value
Organizational Vehicle Parking	16472
POL Allowance	780
21410 Building Paved Apron	7078
21885 Building Paved Apron	0
21910 Building Paved Apron	0
44224 Org. Storage Bldg. Apron	504
44262 Vehicle Shed Apron	0

<b>EXCAVATION PERMIT</b> AR 420-49		DATE:					
<b>INSTRUCTIONS FOR USE OF EXCAVATION PERMIT</b>							
<ol style="list-style-type: none"> <li>1. Excavation permit must be approved prior to any unearthing that penetrates the ground by more than 6 inches.</li> <li>2. Permit will be approved at jobsite.</li> <li>3. The DPW staff shall approve all excavations on Fort Bragg and Camp Mackall. The DOIM shall also approve all excavations on Fort Bragg and Camp Mackall except those in family housing areas. SPRINT shall approve all excavations in family housing areas. DOIM may direct requestor to obtain SPRINT approval for excavations at other locations.</li> <li>4. The requestor shall contact DPW at 398-0321 for an appointment to field locate underground lines at least 5 full duty days in advance of desired work commencement. The requestor shall meet with these organizations at the jobsite with the project/contract drawings.               <ol style="list-style-type: none"> <li>a. DPW, Utilities Branch</li> <li>b. DOIM, Outside Plant Branch</li> <li>c. SPRINT</li> <li>d. Time Warner Cable Company</li> <li>e. North Carolina Locate Service</li> </ol> </li> <li>5. Approval expires 60 days after date of approval signatures unless specified otherwise.</li> <li>6. Each excavation site must have separate approval. A copy of the permit must remain at the jobsite while work is in progress.</li> <li>7. Contractors shall <b>NOT</b> operate any utilities systems.</li> <li>8. Any excavations on Pope Air Force Base require a Work Clearance Permit issued by the Base Civil Engineer.</li> </ol>							
1. Clearance is Requested To Proceed With Work At	Service/Work Order No.	Contract No.					
2. Method of Excavation	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; padding: 2px;">Hand</td> <td rowspan="3" style="padding: 2px;">Other (specify)</td> </tr> <tr> <td style="padding: 2px;">Power shovel</td> </tr> <tr> <td style="padding: 2px;">Ditcher</td> </tr> </table>		Hand	Other (specify)	Power shovel	Ditcher	
Hand	Other (specify)						
Power shovel							
Ditcher							
3. Scope of Work (depth, width, length, location and sketch as applicable). If contract, a copy of applicable drawings or sketches must be attached.							
4. Date Clearance Required	5. Termination Date Of Clearance (60 Days Unless Specified)						
6. Requesting Organization Or Company	7. Phone No.	8. Signature (Requesting Official)					
9. Excavation Clearance Approval							
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 15%;">Type</th> <th style="width: 15%;">Location</th> <th style="width: 15%;">Requestor</th> <th style="width: 15%;">Approved By</th> <th style="width: 15%;">Date</th> </tr> </table>	Type	Location	Requestor	Approved By	Date		
Type	Location	Requestor	Approved By	Date			
Electrical Underground Distribution	Primary - Sandhills Utility Service Secondary - DPW						
Steam or HTW Distribution	Honeywell						
Chiller Distribution	Honeywell						
Sewer Lines	DPW						
Water Distribution	DPW						
Natural Gas Distribution	DPW or Honeywell or Piedmont						
Telephone	DOIM						
Telephone	Embark						
Cable Company	Time Warner						
Other							
<b>DIGGING WILL NOT BE PERMITTED UNLESS SIGNED</b>							



# **APPENDIX = FT. BRAGG TREE REPLACEMENT POLICY**



REPLY TO  
ATTENTION OF  
IMSE-BRG-PWE

**DEPARTMENT OF THE ARMY**  
**US ARMY INSTALLATION MANAGEMENT COMMAND**  
**HEADQUARTERS, UNITED STATES ARMY GARRISON, FT BRAGG**  
**2175 REILLY ROAD, STOP A**  
**FORT BRAGG, NORTH CAROLINA 28310-5000**

7 Jul 09

MEMORANDUM FOR Whom It May Concern

SUBJECT: Tree Replacement/Replanting Values on Fort Bragg

1. In an effort to maintain the *Pinus palustris* (longleaf pine) ecosystem and Red-Cockaded Woodpecker (RCW) habitat on the installation as required by the US Fish and Wildlife Service, the following number of longleaf pine must be replanted when a pine of the denoted size is removed for areas less than one acre. Size is indicated by diameter at breast height (DBH) in inches of the tree removed. For acreage of clear-cut greater than one acre, replace with an acre for acre value in *Pinus palustris* for any type pine removed and for all hardwoods removed, replant an oak/hickory mix at 1:1. These values are based on a 2001 study of the carbon sequestration potential of Southeastern pine forests by Dr. Richard Birdsey of the US Forestry Service.

a. Replacement value for Longleaf Pine (*Pinus palustris*) under 1 acre total: Outside of a managed forest partition (i.e., RCW habitat, Greenbelt Area)

4" -9.99" DBH = 2:1

10"- 13.99" DBH = 4:1

14" + DBH = 6:1

Old growth/flat top (identified by ID w/number) = 8:1

b. Inside of a managed forest partition (i.e., RCW habitat, Greenbelt Area)

4" -9.99" DBH = 4:1

10"- 13.99" DBH = 6:1

14" + DBH = 8:1

Old growth/flat top (identified by ID w/number) = 16:1

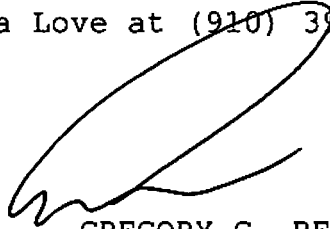
IMSE-BRG-PWE

SUBJECT: Tree Replacement/Replanting Values on Fort Bragg

c. Replacement value for hardwoods (all): 1:1

d. For tree removal in acreages greater than one acre, replace with *Pinus palustris*, replanted acre for acre.

3. Point of contact is Julia Love at (910) 396-6386.

A handwritten signature in black ink, appearing to read 'GREGORY G. BEAN', is written over the printed name.

GREGORY G. BEAN

Director of Public Works

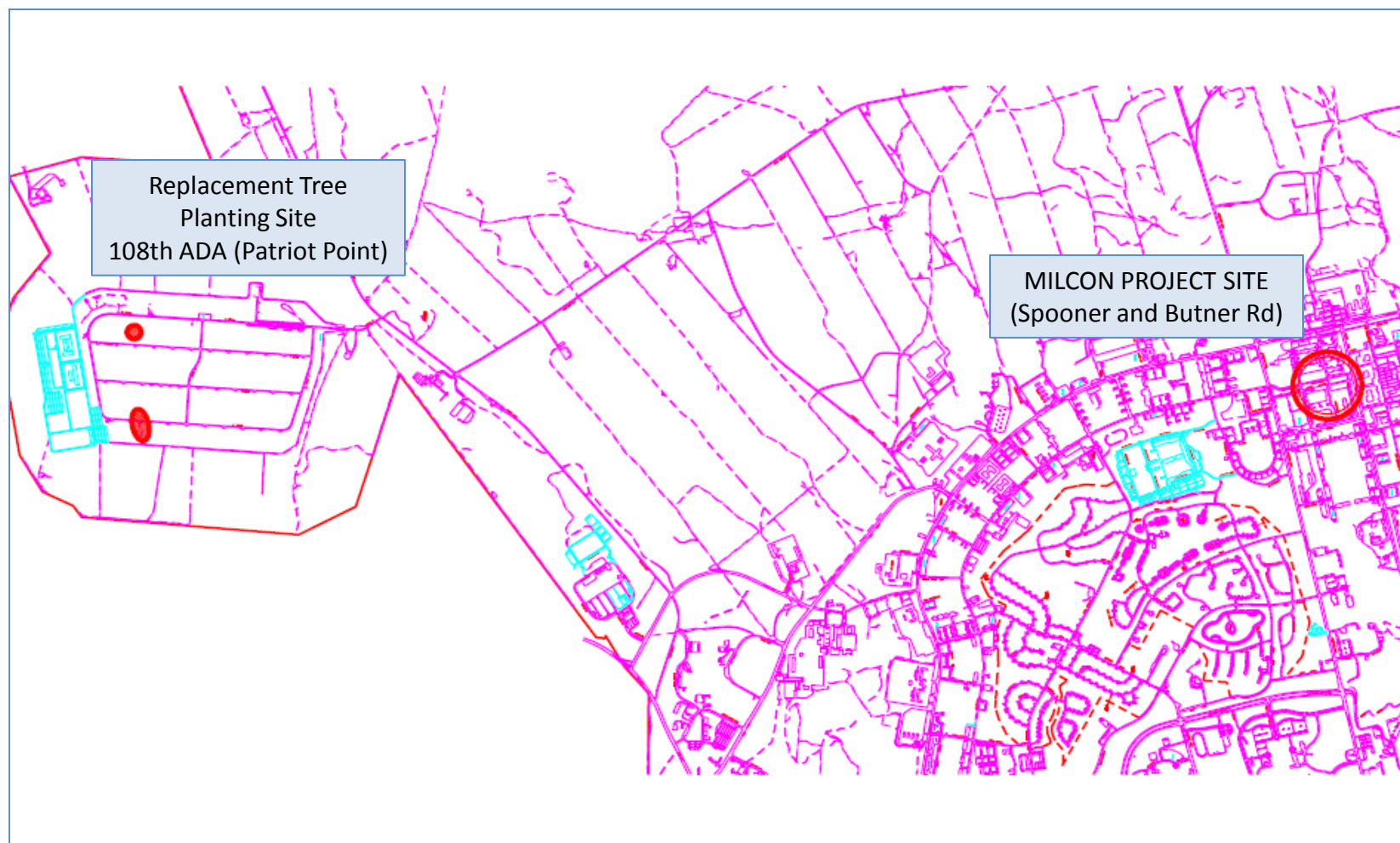
PN 64342 TEMF

\*4 Tree Replacement: Additional Details

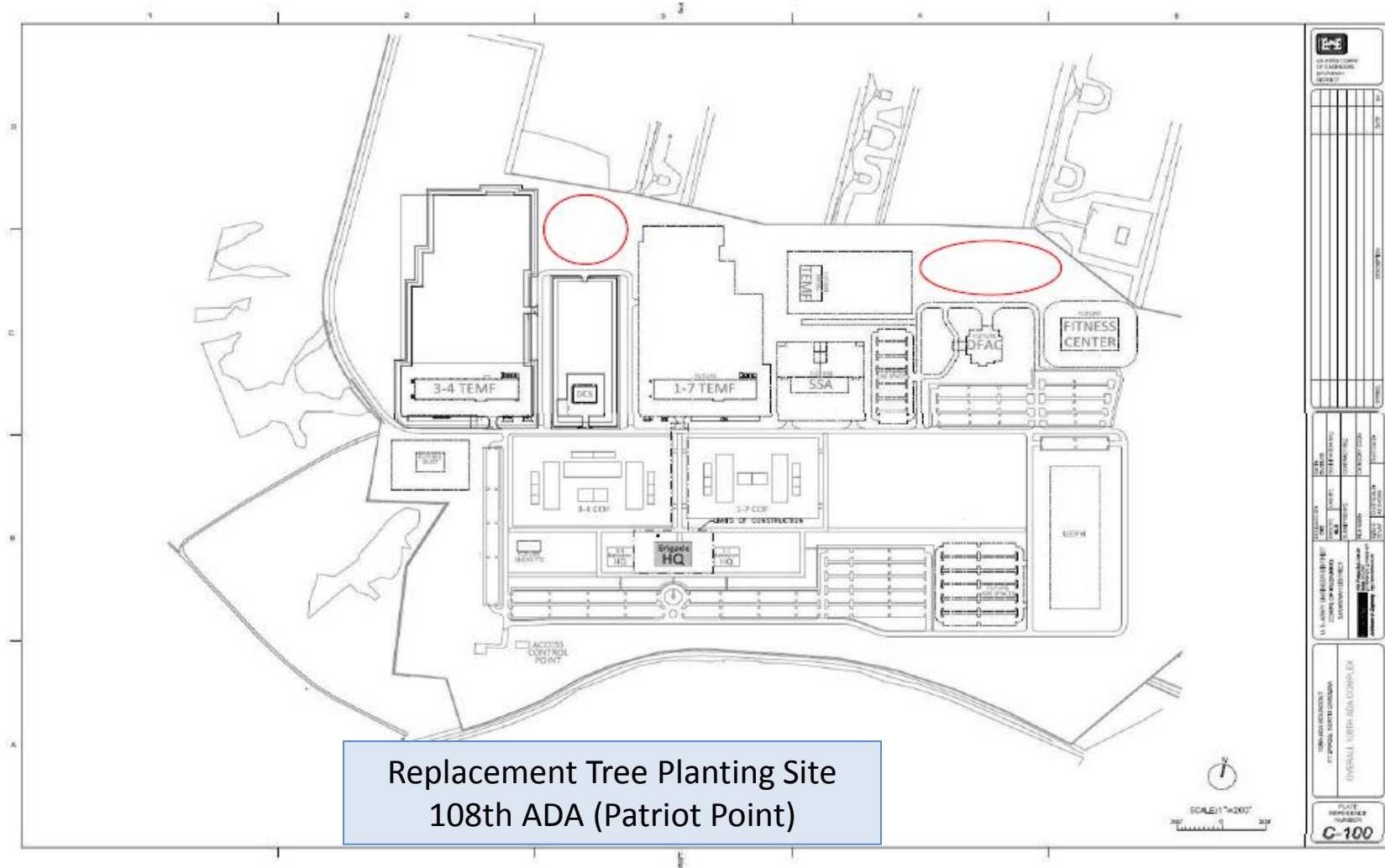
Supply/plant 220 long leaf pine trees, 5 gallon bucket size, in the 108th ADA complex, Patriot Point (old ASP). See map provided.

Actual planting time will be determined by the Wildlife biologists dependent upon weather for best chances of survival.

# Brigade Complex, Vehicle Maintenance Shop, PN64342, FY11 Replacement Tree Planting Location



# Brigade Complex, Vehicle Maintenance Shop, PN64342, FY11 Replacement Tree Planting Location



**APPENDIX KK**

**CONTRACTOR INSTALLATION  
DESIGN GUIDE (IDG)  
FOR  
FORT BRAGG SPECIFIC  
COMMUNICATIONS  
INFRASTRUCTURE REQUIREMENTS**

**DEPARTMENT OF THE ARMY  
NETWORK ENTERPRISE CENTER-FORT BRAGG  
(NEC-FORT BRAGG)**



**CONTRACTOR INSTALLATION DESIGN GUIDE (IDG)  
FOR  
FORT BRAGG SPECIFIC  
COMMUNICATIONS INFRASTRUCTURE REQUIREMENTS**

**MARCH 2009 rev. 4**

Distribution A

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Contractor Installation Design Guide (IDG) for  
Communications Infrastructure Requirements, March 2009

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Contractor Installation Design Guide (IDG) for  
Communications Infrastructure Requirements, March 2009

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Contractor Installation Design Guide (IDG) for  
Communications Infrastructure Requirements, March 2009

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## INTRODUCTION

**NEC- Fort Bragg:** The Network Enterprise Center plans, programs, operate and maintain base operations Information Technology (IT) support and services for Fort Bragg. It provides power projection IT support for contingency missions, emergency and split base operations and support for USAR and ROTC units of North Carolina.

Areas of Interest:

### **Communications Systems & Systems Support:**

The NEC-FORT BRAGG provides customers with switch-based and wireless communications to facilities and/or activities of an installation, which are designated by the installation commander to be critical to accomplishing the mission. Other serves include providing cable infrastructure, networks, and external network necessary to deliver electronic information to, from, and among mission-critical facilities/activities.

### **Visual Information:**

The NEC-FORT BRAGG provides customers with visual information (VI) products and services to include: graphic art, still imagery, motion imagery, historical documentation, multimedia, web page design, audio, consultation/instruction, media loan/issue, equipment/ systems, broadcast, and presentation support. VI processes include those functions required to maintain visual information resources. Products and services are compatible with current and emerging network-centric information technology architectures to enhance war fighting capabilities.

### **Information Assurance:**

The NEC-FORT BRAGG provides infrastructure and management services to protect Non-Secure Internet Protocol (NIPRNET), Secret Internet Protocol Network (SIPRNET) information, and information systems from unauthorized access and to protect the data within the systems. Services cover communication security and computer security requirements; includes network security features such as intrusion detection and controlled access, standard workstation security tools such as virus detection software, advice and assistance for accreditation documentation, security training, analysis of computer security incidents, and Information System Security monitoring.

### **Information Technology:**

The NEC-FORT BRAGG provides common-user software and hardware components/support necessary to process and store data, as well as the management services needed to maintain them. Information Technology can exist with or without external communicators or networking (i.e., connected vs. stand-alone systems).

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## 1.0 PURPOSE.

This Installation Design Guide (IDG) provides information in addition to the I3A that will enable the qualified communications contractors to meet the specific communications infrastructure requirements that are compatible with the NEC-FORT BRAGG architecture. Some of these items either add information or clarify broader gauge instruction provided in the I3A. The NEC-FORT BRAGG has also provided a preferred materials list within this document that will enable standardization with previously installed components at Fort Bragg.

## 2.0 APPLICABILITY.

This IDG applies to all subcontractors performing installation infrastructure work for the NEC-FORT BRAGG, as specified in their contract with CONTRACTOR. Stricter requirements may be imposed by subcontractors upon their employees or sub tier contractors. Subcontractors must follow the requirements of this IDG; however, the means of implementation may vary as determined by the subcontractor.

## 3.0 REQUIREMENTS.

**NOTE: General electrical trade staff (electricians) shall not be used for the installation of the premises distribution system cables and associated hardware unless they are certified BICSI installers.**

Equipment delivered and placed in storage shall be stored with protection from the weather, humidity and temperature variation, dirt and dust, or other contamination.

Commercial off the shelf manuals shall be furnished for operation, installation, configuration, and maintenance for all products provided as a part of the premises distribution system. Specification sheets for all cable, connectors, and other equipment shall be provided.

A record of all installed patch panels and outlets shall be provided in hard copy format per ANSI TIA/EIA-606. The hardware records shall include only the required data fields per ANSI TIA/EIA-606.

All work shall be performed by a certified Telecommunications Contractor, hereafter referred to as the Contractor. In addition, all equipment shall be furnished and installed by a certified Telecommunications Contractor. The qualifications of the Manufacturer, Contractor, and the Installer to perform the work are specified herein. This shall include proof of the minimum qualifications specified herein.

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### 3.1 Contractor Qualifications:

Contractor shall have a minimum of 3 years experience in the application, installation and testing of the specified systems and equipment to be installed. All Communication System Design will shall be performed and stamped by a Registered Communications Distribution Designer (RCDD) certified by Building Consulting Services International (BICSI).

All supervisors assigned to the installation of this system or any of its components shall have a minimum Level 2 Installer certification from BICSI and installers assigned to the installation of this system or any of its components shall have a minimum Level 1 Installer certification from BICSI. All supervisors and installers shall have factory certification from each equipment manufacturer that they are qualified to install and test the provided products.

Installers: The Contractor shall submit certification to the Contracting Officer (NEC-FORT BRAGG Plans and Requirements Branch (PRB) that all the installers are factory certified to install and test the provided products.

All installers assigned to the installation of this system or any of its components shall have a minimum of 3 years experience in the installation of the specified copper and fiber optic cable and their components.

#### 3.1.1 Contractor Responsibility

The Contractor shall be responsible for recording and providing, to the Contracting Officer, all test data within 7 days of system final testing. A record of all installed cable shall be provided in hard copy format per ANSI TIA/EIA-606. The cable records shall include the required data fields for each cable and complete end-to-end circuit report for each complete circuit from the assigned outlet to the entry facility per ANSI TIA/EIA-606. For all fiber optic cables, power meter test results shall be provided in a hard copy format. All twisted pair copper cables shall have a disk copy output of the test results with station ID assigned.

### 3.2 Contractor Personnel:

#### 3.2.1 Program Manager (PM)

The contractor shall provide a PM and alternate(s) responsible for contract performance and continuity. The contractor shall identify the Program Manager or alternate's range of authority to act for the contractor relating to daily contract operation. The Contractor Program Manager shall provide the following while performing any tasks associated with this IDG to the NEC-FORT BRAGG PRB.

##### 3.2.1.1

Weekly project status report to NEC-FORT BRAGG PRB



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#### 3.2.1.2

A project timeline that illustrates critical milestones and/or other significant points of interest (i.e. road closures, facility access, etc.).

#### 3.2.1.3

Request for information, modification, or engineering changes to the original SOO. All requests shall be made in writing and submitted to NEC-FORT BRAGG PRB for action.

#### 3.2.1.4

Changes in schedule or delays that will cause a change in the project timeline

#### 3.2.1.5

Submit all work order clearance requests (digging permits) to DPW no later than 2 weeks in advance of schedule excavations.

#### 3.2.2. Team Leader

The Contractor shall designate the Contractor's on-site team leader and alternate(s) as the Site Point of Contact (POC) for individual projects in their Site Visit Request Letter. The Site POC or alternate(s) shall be on site during duty hours until project completion.

The Site POC shall be the interface for all work site communications with the government, including quality, safety, and discrepancy matters.

The Site POC shall provide NEC-FORT BRAGG PRB with their contact information (i.e. phone number, e-mail, etc.).

#### 3.2.3. Team Communication

The Program Manager, Site POC, and respective alternate(s) shall be able to read, write, speak, and understand English.

#### 3.3 Manufacturer Qualifications:

The equipment and hardware provided under this contract shall be from manufacturers that have a minimum of three years experience in producing the types of systems and equipment specified.

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### 3.4 Manufacturer Recommendations:

Where installation procedures, or any part thereof, are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations, prior to installation shall be provided. Installation of the item will not be allowed to proceed until the recommendations are received and approved.

### 3.5 Materials and Equipment:

Materials and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of the products and shall be the manufacturer's latest standard design that has been in satisfactory use for at least 1 year prior to installation. Materials and equipment shall conform to the respective publications and other requirements specified below and to the applicable requirements of NFPA 70.

Where materials and equipment are specified to conform, be constructed, or tested to meet specific requirements, certification that the items conform to such requirements must be provided. Certification by a nationally recognized testing laboratory that a representative sample has been tested to meet the requirements, or a published catalog specification statement to the effect that the item meets the referenced standard, will be acceptable as evidence that the item conforms. Compliance with these requirements does not relieve the Contractor from compliance with other requirements of the specification.

### 3.6 Ft Bragg Outside Plant Design Support

Planning and design of outside plant fiber optics and copper cable plant at Ft Bragg must be coordinated through NEC-FORT BRAGG. NEC-FORT BRAGG will provide the following information and assistance to the design engineer for the proposed facility design;

- Location of nearest fiber service and strand count
- Location of the nearest copper service and cable count
- Location of nearest manhole, handhole, or base cable support infrastructure that can provide a duct tie-in point
- Fiber optic and/or copper cable designation for labeling any new cables required
- Numbering scheme for manhole, handholes, pedestals, and other base cable support infrastructure
- Field support to engineer/designer during engineering site survey
- Reserve copper cable counts, fiber strand counts, and rack space provided by NEC-FORT BRAGG
- Reserve and duct pathways identified by the design engineer
- Any drawings available to aid the design engineer with base cable pathway or duct bank design.

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### 3.7 Initial Design requirements for Ft Bragg

Design of outside plant pathways, outside plant cable scheme, cable placement in ducts and all other design requirements for outside plant shall be completed by the design engineer, not NEC-FORT BRAGG. Please refer to the Army I3A document, specifically figures C-2 through C-6 to obtain typical drawings required as submittals for outside plant design.

- The design engineer shall not use the last remaining duct in any pathway system/ductbank on Ft Bragg. The design shall include one spare duct for maintenance purposes in any segment of pathway or duct bank design on Ft Bragg.

When no existing fiber or copper service is available near the proposed facility location, the following scenarios will apply;

- Design engineer shall be required to provide service to the nearest Area Distribution Node (ADN) or Remote Switch Unit (RSU).
- To preserve limited duct space at the ADNs and RSUs, it is required at Ft Bragg to place a substantially larger cable into the facility than may be necessary for the project under design.
- NEC-FORT BRAGG requires a minimum fiber optic design of 288 strands from any ADN
- NEC-FORT BRAGG requires a minimum of 2400 copper cable pair design at any RSU location

NOTE: Tab F of the 1391 shall include compensation for upsizing any cable system planned from an ADN or RSU point of demarcation.

### 4.0 DELIVERABLES/SUBMITTALS.

Deliverables are to be transmitted with a cover letter, on the prime contractor's letterhead, describing the contents. Built drawings shall be delivered within 14 days of completion of project.

All test results will be required as applicable to this project. Test results will be required 7 days after completion of all testing. Three copies will be submitted. One copy will be sent to the identified POC at NEC-FORT BRAGG. Two copies will be provided to the servicing Contracting Office.

Government approval is required for submittals. The NEC-FORT BRAGG Plans and Requirements Branch has to review everything that is submitted and/or delivered to include the following:

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#### 4.1 Drawings:

##### 4.1.1 Premises Distribution System

Written certification that the premises distribution system complies with the EIA ANSI/TIA/EIA-568-b.1, b.2, and b.3, EIA ANSI/TIA/EIA-569-A, EIA ANSI/TIA/EIA-606 standards, and EIA ANSI/TIA/EIA-607 standards.

Detail drawings, size E drawing format, including a complete list of equipment and material. Detail drawings shall contain complete wiring and schematic diagrams and other details required to demonstrate that the system has been coordinated and will function properly as a system. Drawings shall include vertical riser diagrams, equipment rack details (to include complete wire management support systems in Telecommunications Room), elevation drawings of telecommunications room wall, outlet face plate details for all outlet configurations, size and types of cables, conduits, and cable trays.

Drawings shall show proposed layout and anchorage of equipment and appurtenances and equipment relationship to other parts of the work including clearance for maintenance and operation.

##### 4.1.2 Record Drawings

Record drawings for the installed wiring system infrastructure per EIA ANSI/TIA/EIA-606. The drawings shall show the location of all cable terminations and location and routing of all backbone and horizontal cables. The identifier for each termination and cable shall appear on the drawings.

##### 4.1.3 As-Built Drawings:

###### 4.1.3.1 Drawing Format

The contractor shall provide all drawings in either AutoCAD or Microstation formatted drawings. The contractor shall contact NEC-FORT BRAGG PRB for information regarding software requirements to accomplish all updates identified in this IDG.

###### 4.1.3.2 Drawing Submittals

The contractor shall provide the NEC-FORT BRAGG PRB one (1) electronic and (1) hardcopy of the proposed route prior to construction and the final installation Cable Diagram drawings, "D" size series.

The drawings shall reflect all cable and duct pathways, manholes, manhole sizes, distance between manholes, number of conduit in each duct bank, and the size, type, and cable designations.

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The contractor shall provide three (3) hard copies of the “red-line” Cable Diagram drawings, “D” size series to NEC-FORT BRAGG PRB prior to or during final inspection and acceptance.

#### 4.1.3.3 Butterfly Drawings

The contractor shall provide the NEC-FORT BRAGG PRB one (1) electronic and (1) hardcopy of the proposed installation prior to construction and the final installation of the Manhole Racking Diagram (butterfly) “D” size series drawings. The drawings shall reflect all cable and duct penetrations, manhole sizes, conduit placement in relation to the manhole, and the size, type, and cable designation.

The contractor shall provide three (3) hard copies of the “red-line” Manhole Racking Diagram (butterfly) drawings, “D” size series to NEC-FORT BRAGG PRB prior to or during final inspection and acceptance.

#### 4.2 Testing:

##### Category 6 Premise Cabling

- A. Every cabling link in the installation shall be tested in accordance with ANSI/TIA/EIA-568-B.1.
- B. The horizontal cabling shall be tested from the communications rooms patch panel to the wall outlet using the specification of ANSI/TIA/EIA-568-B.1.
- C. All of the installed cables must be tested and must pass the specifications of ANSI/TIA/EIA-568-B.1.
- D. Any cable that fails shall be re-terminated and tested again. If the cable does not meet specifications after terminating again, replace the cable, terminate, and test again.
- E. A paper copy of the test results shall be provided in a three-ring binder and presented to the NEC-FORT BRAGG PRB.

The following summary information shall be included:

- The identification of the link in accordance with labeling scheme.
- The name of the building where the cable is located.
- The brand name, model, and serial number of the tester.
- The identification of the tester interface.
- The revision of the tester software and the revision of the test standards database in the tester.
- The overall pass/fail evaluation of the link being tested, including the Near End Cross Talk (NEXT) Headroom (overall worst case) number.
- Date and time the test results were saved in the memory of the tester.

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- The name of the standard selected to execute the stored test results.
  - The type of cable being tested (Cat 6).
- F. The detailed test results must include the following parameters:
- Wire map
  - Length
  - Insertion loss
  - Near-End Cross Talk (NEXT)
  - Power Sum Near-End Cross Talk (PSNEXT)
  - Equal-Level Far End Crosstalk (ELFEXT)
  - Power Sum Equal-Level Far-End Crosstalk (PSELFEXT)
  - Return loss
  - Propagation delay
  - Delay skew
- G. The test equipment shall comply with or exceed the accuracy requirements for the proposed Level III field testers as defined in the TIA Cat 6 Standard.
- H. The pass or fail condition for the link being tested is determined by the results of the required individual tests. Any fail or fails result yields failure for the link-under-test.
- I. The test results for each link shall be recorded in the memory of the field tester upon completion of the test.
- J. The test results saved by the tester shall be transferred to a CD-ROM. A guarantee must be made that the measurement results are transferred to the CD-ROM unaltered, that is, as saved by the tester at the end of each test. The guarantee also must specify that the results cannot be modified later.
- K. The test results for the completed job shall be stored and delivered to NEC-FORT BRAGG PRB on a CD-ROM, including the software tools required to view, inspect, and print any selection of test reports.

Copper Cabling - OSP and telephone cross-connect cable

A. Existing Cables. Prior to splicing, test existing pairs to be spliced into the new cable. The contractor's tests shall check for cable faults (grounds, shorts, crosses, opens), splicer's errors (splits, reverses, transpositions), shield continuity, and insulation resistance (insulation resistance on existing cables is accomplished on spare pairs only). The contractor shall not be responsible for correcting existing cable faults, splicer's errors, open shield continuity or low insulation resistance; however, the NEC-FORT BRAGG PM must be notified of such conditions immediately upon identification.

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- B. New Cables. After splicing and terminating new cable and prior to splicing any new cable into existing cable, the new cable will be tested and documented to be free of cable faults (grounds, shorts, crosses, and opens) and splicer's errors (splits, reverses, and transpositions).
- C. After splicing and terminating new cable and prior to splicing new cable into existing cable, insulation resistance as tested on a minimum of three conductors in each 25 pair group of the new cable against all other conductors of the cable and the shield, shall be documented to be of a value that is satisfactory for the length and type cable being tested.
- D. After splicing and terminating new cable and prior to splicing new cable into existing cable, test to ensure the cable shield is continuous from the Main Distribution Frame (MDF) to each distant termination point.
- E. After splicing new cable into existing cable test the cable for end-to-end cable faults (grounds, shorts, crosses, and opens) and splicer's errors (splits, reverses, and transpositions). Any cable faults or splicer's errors not documented on existing cable test shall be cleared by the contractor, if caused by the new cable installation.
- F. Insulation resistance as tested on a minimum of three non-working conductors in each 25 pair group of the cable shall be documented to be of a value that is satisfactory for the length and type cable being tested.
- G. Loop Resistance Tests: After all splicing and terminating is complete, make a D.C. loop resistance measurement on all affected (non-working) cable pairs. Measure from all terminals back to the cable origin or central office
- H. Cable Shield Continuity. Test to ensure the cable shield is continuous from the MDF to each distant termination point.
- I. Test results may be recorded on locally developed test sheet.
- J. Where the contractor uses an existing ground point, it shall be tested prior to being connected to the system. Even though the National Electrical Code calls for a resistance to ground not to exceed 25 ohms, Military Handbook 419A, paragraph 2.2.2.2 states that 25 ohms is not low enough. In order to protect personnel and equipment, MIL-HDBK 419A recommends a design goal of 10 ohms for communications systems w NEC-FORT BRAGG PM in writing of the defective ground. The tests to be performed on the grounds shall measure the ground potential (ability to dissipate voltage through the ground point to the earth).

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Fiber Optic Cable

- A. All of the installed fiber optic cables must be tested and must pass the requirements of ANSI/TIA/EIA-568-B.
- B. Every fiber optic cable in the installation shall be tested in accordance with field test specifications as defined in ANSI/TIA/EIA-568-B.
- C. Any cable that fails these tests must be diagnosed and corrected. The corrective action shall be followed with a new test to prove that the corrected link meets the performance requirements. The final and passing test must be saved and included in the final test results documentation.
- D. Field test instruments for single-mode fiber cabling shall meet the requirements of ANSI/TIA/EIA-526-7.
- E. The test results for each link shall be recorded in the memory of the field tester upon completion of the test.
- F. The test results saved by the tester shall be transferred to a CD-ROM. A guarantee must be made that the measurement results are transferred to the CD-ROM unaltered, that is, as saved by the tester at the end of each test. The guarantee also must specify that these results cannot be modified later.
- G. The test results for the completed job shall be stored and delivered to NEC-FORT BRAGG PRB on a CD-ROM, including the software tools required to view, inspect, and print any selection of test reports.
- H. A paper copy of the test results shall be provided to NEC-FORT BRAGG PRB in a three-ring binder.

The following summary information shall be included:

- The identification of the link in accordance with the NEC-FORT BRAGG labeling scheme.
- The name of the building where the cable is located.
- The brand name, model, and serial number of the tester.
- The revision of the tester software and the revision of the test standards database in the tester.
- The overall pass/fail evaluation of the link being tested.



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- The name of the standard selected to execute the stored test results.
- Cable type and the value of the index of refraction used to calculate lengths.
- The insertion loss (attenuation) measured at each wavelength, the test limit calculated for the corresponding wavelength and the margin (difference between the measured attenuation and the test limit value).
- The link length shall be reported for each optical fiber for which the test limit was calculated using the following formulas:
  - $\text{Link Attenuation} = \text{Cable Attenuation} + \text{Connector Attenuation} = \text{Splice Attenuation}$
  - $\text{Cable Attenuation (dB)} = \text{Attenuation Coefficient (dB/km)} * \text{Length (km)}$
  - $\text{Connector Attenuation (dB)} = \text{number\_of\_connector\_pairs} * \text{connector\_loss (dB)}$   
(Maximum acceptable connector loss = 0.75 dB)
- I. The date, time, and test results will be saved in the memory of the tester
- J. All fiber strands shall be tested Bi-directionally End-to-End (each segment of cable, building-to-building, etc.) @ 1550nm and 1330nm.
- K. Optical fiber Cable testing shall be conducted according to ANSI/TIA-EIA568-A, Annex H. Each optical fiber shall be tested Bi-Directionally utilizing Optical Power Meter@ 1550 and 1330 nm.
- L. Optical fiber Cable shall be conducted according to ANSI/TIA-EIA568-A, Annex H. Each optical fiber shall be tested and recorded Bi-Directionally utilizing OTDR.
- M. At minimum, OTDR traces are required for Outside Plant Fiber Optic Tests. A Power Meter may be used for premise fiber horizontal or facility backbone cabling.

#### 4.2.1 Test Plan

Test plan defining the tests required to ensure that the system meets technical, operational and performance specifications, 60 days prior to the proposed test date. The test plan must be approved before the start of any testing. The test plan shall identify the capabilities and functions to be tested, and include detailed instructions for the setup and execution of each test and procedures for evaluation and documentation of the results.

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#### 4.2.2 Test Reports

Test reports in booklet form with witness signatures verifying execution of tests. Reports shall show the field tests performed to verify compliance with the specified performance criteria. Test reports shall include record of the physical parameters verified during testing. Test reports shall be submitted within seven business days after completion of testing to the NEC-FORT BRAGG Plans and Requirements Branch for Quality Assurance Inspection purposes.

#### 4.3 Spare Parts

Spare parts, tools, and test equipment provided under this contract shall be submitted to NEC-FORT BRAGG PRB along with an inventory of these spare parts, tools, and test equipment. The inventory data shall include a complete list of parts and supplies, with current unit prices and source of supply, and a list of spare parts recommended for stocking.

### 5.0 GENERAL

#### 5.1 Telecommunications Room (TR) Requirements:

Per I3A, figure B-4, Telecommunication rooms must be an appropriate size to accommodate the proposed cable/local area network (LAN) distribution system and associated connectivity equipment for any given facility and/or facility floor. The minimum size telecommunications room for system installation is 8 feet by 10 feet. This would support a two-equipment rack configured system. If any additional equipment/racks are placed in a TR, the TR must be enlarged to meet the requirement of having a full 36 inches of space between the communications rack assembly and the nearest wall. The entrance door must swing outward into the hallway, or additional room square footage must be added to the floor space to accommodate interior door swing.

Minimum distance of three feet separation from wall shall be maintained. Dedicated Ventilation Air Conditioning (VAC) systems support must be provided for each telecommunications room. Systems must be of an appropriate capacity to self-support the room per proposed equipment installation requirements. VAC systems must not take up any floor space within the comm. room. A dedicated 20 Ampere (Amp) circuit for the use of a VAC system. Preference for placing a Telecommunications room is towards the center of any given facility. If facility is multiple stories, preference is for stacked telecommunications room placement, facilitating easy interconnectivity between telecommunication rooms.

#### 5.2 Equipment Mounting Backboard

In addition to Para 2.5.6 in the I3A, NEC-FORT BRAGG requires covering no less than two walls with fire rated plywood.

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### 5.3 Ladder and Wire Cable Tray

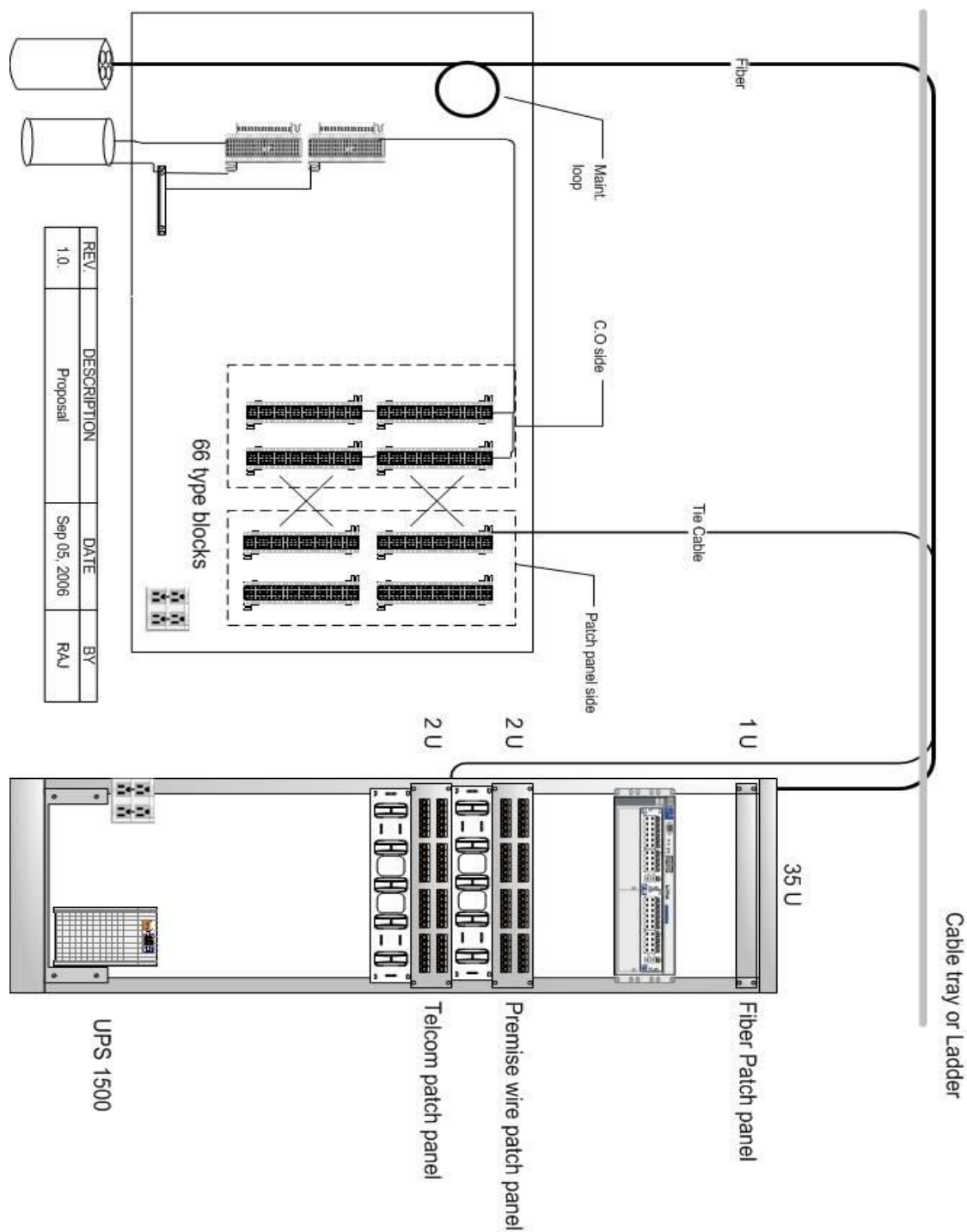
Per I3A, figures B-4 and B-8, channel type cable ladder must be used in the TR to provide distribution between the telephone backboard, equipment racks, backbone conduits and the distribution cable tray. Welded wire cable tray (Flextray or equivalent) must be used to distribute premise cabling outside the TR.

### 5.4 Equipment Racks – See Figure 5-4.

Floor mounted equipment racks shall be standard 19-inch aluminum relay racks, uprights shall be three inches deep, 1 ¼ inches wide, drilled and tapped 12-24 in a half inch patterns. Racks shall be provided with a standard top cross-member, and predrilled base plate to allow floor fastening. Open frame equipment racks shall be seven feet in height and clear coated. AC outlets shall be provided in the equipment rack to prevent tripping; one quad outlet dedicated 20-Ampere line assembly, per every two equipment racks provided.

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Figure 5-4



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## 5.5 Cable Management

Cable management shall be specifically manufactured for routing cables, wires and patch cords horizontally and vertically on standard 19-inch equipment racks. Cable management shall consist of ring or bracket-like devices mounted on rack panels for front horizontal use or of a type that utilizes duct fingers with snap on covers. Cable management shall mount to racks by screws and/or nuts and lock washers. Cable management shall be provided above, below and to both sides of each patch panel on the standard 19-inch equipment rack(s). Vertical cable management will be provided between and to the ends of equipment racks, and provide front and rear vertical cable management. Vertical Cable management shall be of a type that utilizes duct fingers with snap on covers. Cable management will be provided in the rear of the rack, utilizing duct fingers with snap on cover style, or standoff bars. Velcro ties shall be utilized for binding of horizontal distribution wires within the telecommunications room trays and wire management systems.

## 5.6 Horizontal Cable Maintenance Slack

Maintenance loop or slack required for modification or re-termination of horizontal cabling shall be no less than three meters (10 feet), at the distribution closet and no less than 30 centimeters (24 inches) at the outlet. Slack at the user termination shall not be placed in the outlet box, but shall be installed at the nearest practical point to the outlet box. (I.e. above the ceiling prior to entering the wall).

## 5.7 Cable Jacket and RJ-45 Color Code

Standard color code:

Green - The standard wire and jack color for UNCLASSIFIED.

Red - The standard wire and jack color for CLASSIFIED (SECRET)

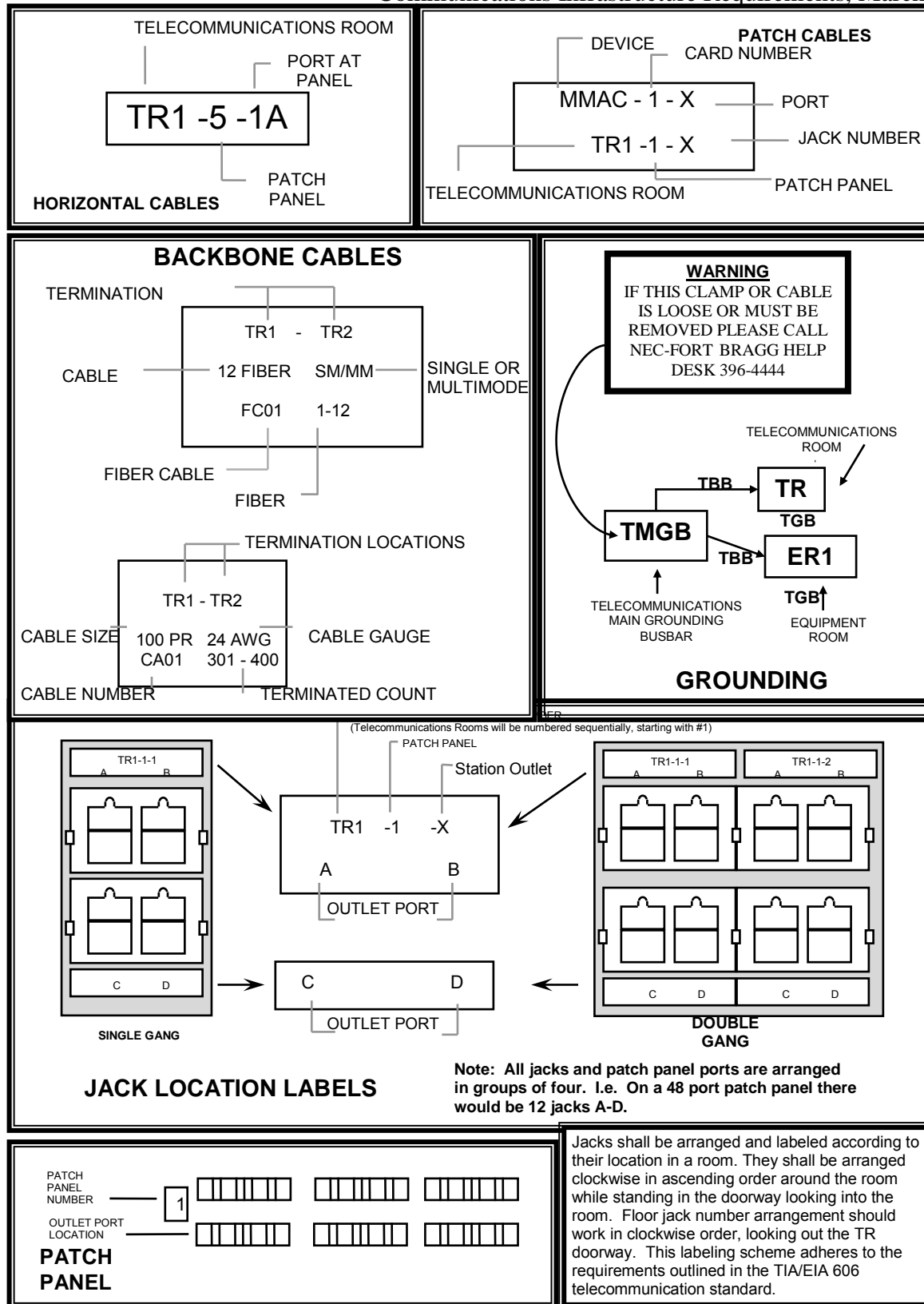
Yellow - The standard wire and jack color for CLASSIFIED (TOP SECRET)

## 5.8 Labeling – Premise Cable

All labeling shall be done in accordance with Fort Bragg NEC-FORT BRAGG standard labeling scheme provided as a technical exhibit to this specification. See Figure 5-8...

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**Figure 5-8**  
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## 5.9 Geospatial Information

### 5.9.1 Format.

Geospatial information shall be delivered on storage media (specify magnetic or optical media preferences), in a “shape file” format within a folder named the same as the prefix of the shape file, e.g., if the shape-file is named "points\_pafb\_28.shp" the folder shall be named "points\_pafb\_28". The folder shall contain all the files that make up the general shape file, i.e., “.shp”, “.shx”, “.dbf”, etc. along with a standard metadata file, i.e., “.shp .xml”. Any collected “z-values” shall be reported in a dedicated field, in the appropriate table, and in the format/datum consistent with the standard elevation methods in use by the DPW.

### 5.9.2 Attributes.

Attributes and data table formats for communication infrastructure/facilities are described and defined in the Communications Mission Data Set promulgated by the NEC-FORT BRAGG PRB. The following attributes are to be reported in the appropriate shape file for the geospatial features collected by the contractor:

- Manhole Number
- Secure Manhole Lid (Yes or No)
- Location of Manhole\Nearest Intersection
- Nearest Manhole
- Nearest Bldg
- Existing Copper Cables
- Existing Fiber Cables
- Comments (Manhole Condition)
- Date Collected
- Date of Last update
- Obstructions

Subcommodity\_a (Table: xxxyyy) {for feature y}

Attribute\_1 (Field: aaabbb)

Attribute\_4 (Field: cccddd)

Subcommodity\_e (Table: yyyzzz) {for feature z}

Attribute\_7 (Field: zzzaaa)

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### 5.9.3 Data Delivery

The contractor shall provide the geospatial information in electronic format to each of the following:

NEC-FORT BRAGG PRB, ATTN: Larry White, Fort Bragg, NC 28310

and

NEC-FORT BRAGG Directorate of Public Works (DPW), Fort Bragg, NC 28310

## 6.0 PROTECTED DISTRIBUTION SYSTEM (PDS)

**All PDS design and material data sheets must be submitted to the NEC-FORT BRAGG for approval, prior to procurement or installation to save from costly revisions or change orders.**

**ALL PDS Designs shall be signed off by NEC-FORT BRAGG SIPR planner to ensure proper installation pathway engineering practices are met in the initial design prior to installation.**

**PDS shall NOT be installed in “dead space” areas out of normal inspection areas. I.e. (Closets, bathroom, ceilings and under the floor).**

The Contractor shall install Holocom or an expandable type PDS System solution. The PDS System attributes shall include an interlocking “clam-shell” design that enhances security and flexibility in that it can be securely closed and locked, and then re-opened for security inspections and network changes or enhancements. The PDS must also include an electrostatic powder coating, which provides an aesthetically pleasing appearance. All SIPRnet installation technicians must be certified by the manufacture of the designated product choice to install SIPRnet PDS on Ft. Bragg.

### 6.1 Documentation

- A. NSTISSI 7003, Army Regulation
- B. 25-2 Chapter 6, Army Regulation
- C. Technical Guide for Integration of SIPRNET version 5.0 as a Hardened Carrier PDS
- D. NSTISS, NSTISS Advisory Memorandum (NSTISSAM) TEMPEST 2/95, Red/Black Installation Guidelines, 12 Dec 95.
- E. NSTISS, NSTISSAM TEMPEST 2/95A,
- F. Amendment to TEMPEST 2/95, 03 Feb.



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Per these references, each agency, service, or organization is afforded interpretation and approval authority, by the Designated Approving Authority (DAA), per the respective manual when assessing any PDS design and installation methodology.

6.2 Guidelines (This is a quick reference guide and should not be treated as a substitute to the above listed references.)

**PDS installations shall be inspected by NEC-FORT BRAGG QA/QC personal in 3 phases:**

- 1. Initial pre installation walk thru of bldg PDS pathways.**
- 2. 50% installation inspection prior to cable being installed.**
- 3. Final after cable and epoxy are installed and applied prior to bldg or system turnover.**

6.2.1 Raceway Solution

- A. Ensure that all raceway runs should be approximately 1 inch of the wall, in special instances, this separation may be exceeded but in no case should the raceway be mounted flush with the wall.
- B. There should be no more than ¼ inch play on all vertical TOP CAP and span cuts.
- C. All INF's should be physical inspected to ensure that they are tight and cannot turn.
- D. Lock covers shall be physically inspected to ensure that the lock cap is properly seated inside the locking mechanism. This will be accomplished by grasping by hand and moving from side to side while attempting to remove from raceway.
- E. Thru walls will be run utilizing threaded rigid pipe and locking rings on both the inside and outside of raceway to ensure a secure penetration into the raceway will be maintained.

6.2.2 Electrical Metallic Tubing (EMT) Solution

- A. Use all ferrous thin walls EMT of the following sizes ¾ inch, 1 inch, 1.5 inches, and 2 inches.
- B. Use all ferrous compression fittings only. Plastic is not permitted. Epoxy all fittings upon assembly (except L covers). Steel epoxy all L covers upon completion of all wire pulling and testing. Ensure that all fittings and hangers are secured completely and cannot be loosened or removed by hand prior to the application of epoxy. The epoxy will reveal pilferage. All epoxy must be clean and neat to distinguish pilferage or tamper evidence when periodically inspected by the local security office (once every six months or as required by local policy).
- C. Install all distribution in plain view i.e. not above the ceiling and not behind the walls.
- D. PDS between floors. A PDS installed between floors in multi-story buildings should be installed in the following manner. The section that goes through the false ceiling must be installed in a manner to allow inspection. The ceiling tile can be removed or replaced with a clear tile or egg crate style, if allowable by the local fire code. If neither of those options is viable, an inspection path (tube) should be built around the riser. Conduit within this facility must be at least ¾-inch EMT or galvanized threaded pipe, which should be large enough to accommodate cables that will be ran in the facility at no more than a 40% fill ratio.

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- E. Design the SIPRNET distribution in a tree type fashion. Start at the closet location where the equipment is located with a single EMT sized to contain all CAT 6 wire runs (sizing is 40% fill max in circular mils). Extend the distribution from this backbone to locations. Careful planning will allow for future expansion additionally leave pull strings in place for future growth and expansion.
- F. Run all EMT throughout the building to optimize the separation from water pipes, electrical wires, electrical pipes, plumbing, air conditioning, etc. A minimum of six-inch separation is required.
- G. Have the contractor install cast iron elbows LR's, LB's, LL's and pull boxes also known as C's at critical locations for ease of installing CAT 6 cable. Insure that a pull box is installed at 30 foot intervals for straight runs and after every two 90 degree turns or when you transverse between floors and into new areas.
- H. Secure the EMT to the structure using standard strap and spacer, hangers and anchors (dry wall/toggle bolts, concrete/ expansion bolts, etc.) 360 degree inspection area must be maintained around the PDS.
- I. **Lockboxes.** A lockbox (with internal hinges) is used to protect the PDS termination. Lockboxes used for termination within the LCA should be at least 6 x 6 x 4 inches deep and have a door with internal hinges. The hasp must be permanently fixed to the box. If hinges are external, the hinge pin must be welded. Tap screws may be used internally to mount the terminal block. No other openings or air gaps are authorized for this box. The lock for the lockbox must be a GSA-approved changeable combination lock. The lockbox may terminate up to six connections within the box as long as it is within 12 feet of the classified workstations and/or printer located in the same room.
- J. **Paint.** The carrier must not be painted or covered with wallpaper or any other covering. Coverings can conceal carrier penetration. Paint and coverings are easier to match than the bare material when attempting to hide unauthorized penetration.
- K. All EMT PDS shall be left with PULL STRINGS in place throughout the conduit PDS system, even after cable is pulled in each run.

## 7.0 SECURE ROOM/COMMUNICATION CLOSET

**NOTE: The card reader release mechanism must not be a magnetic lock that will release during a power failure. As a minimum, the door must have a high security dead bolt lock with a 25-millimeter (1-inch) throw and a cylinder that meets the requirements of Underwriters Laboratories, Inc., (UL) 437 Standard for Key Locks.**

- A. Units that will have their nodes operating only during normal business hours require the following site preparation of their closets:
- B. To be certified as a CAA, the area must meet the following physical requirements. The walls, floor, and roof must be of permanent construction materials; i.e., concrete block, concrete, plaster, gypsum wallboard, metal panels, hardboard, wood, plywood, or other materials offering resistance to, and evidence of, unauthorized entry into the area.  
For new construction, walls should extend from true floor to true ceiling (structural floor to structural ceiling) with permanent construction materials. In existing facilities, walls may also

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be extended with 18-gauge expanded steel screen or equivalent wire mesh.

- C. The access door to the area must be substantially constructed of wood or metal. In addition, either a combination type lock such as a KABA-MAS CDX-09 or a card reader lock should be added to the entry door to provide greater physical protection than the single key entry and limit access to authorized personnel.

As an alternative, a built-in GSA-approved combination lock meeting Federal Specification FF-L-2740 can be used. The hinge pins of out-swing doors must be pinned, brazed, or spot-welded to prevent removal. When double doors are used, install an astragal on the active leaf of the door. Doors other than the access door must be solid wood or metal (with no glass panels), have a metal bar that extends across the width of the door, or be secured by another means that will prevent entry from the outside.

- D. Ideally, the area should not contain windows. When windows are used, they should be permanently secured to prevent opening. For new construction, all windows that might reasonably afford visual observation of classified activities within the facility must be made opaque. In existing facilities, windows must be made opaque or be equipped with Room-darkening blinds, drapes, or other coverings. Windows that are less than 5.5 meters (18 feet) above the ground measured from the bottom of the window, or are easily accessible by means of objects directly beneath the windows, must be constructed from or covered with materials that provide protection from forced entry and must be protected by an IDS. The protection provided to the windows need be no stronger than the strength of the contiguous walls.
- E. COMSEC equipment (e.g. Type 1 encryption devices) cannot be installed within an LCA unless it is housed within a GSA-approved, Class 5 security container such as the IPS cabinet specifically designed for housing COMSEC or electronic equipment.
- Classified Storage Containers. If existing safes are used for classified material storage, the locks shall be an X-09 lock. If the safe does not have an X-09 lock, the existing lock shall be replaced to meet this requirement. It may be more cost effective to replace one safe per unit with a GSA-approved safe than to retrofit an old safe with questionable serviceability
  - One option is to place the SIPRNET equipment in an Information Processing System (IPS) container. Diebold Security, Hamilton Products Group, and Trusted System all have a GSA-approved IPS container solution for this project; however, a long lead-time is required for delivery. The container shall have a lockable metal box bolted over the container's cable entrance to provide a point for affixing the PDS to the IPS. The box must be included in the IPS order.
  - In addition, the product (IPS and box) shall have GSA-approval for the finished state, e.g., no unauthorized modifications shall be made to the IPS.

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- A minimum space of 24-inch W x 32 inch D will be reserved for the locking SIPRNET Node cabinets in the communication closets. The dimensions for the IPS container are 31¾-inch W x 43 inch D x 28½ inch H. The space may be an unused corner in the room. A standard 120Volts AC, 20-ampere receptacle is required to power the UPS in the container.

## **8.0 SIPRNET COMMUNICATION ROOM**

### **8.1 New Construction Guidance**

- A. One SIPRNET room will be required for each building, located adjacent to the main telecommunications room, (TR) and opening to the interior of the building.
- B. The SIPRNET room will be a minimum of 6 feet by 6 feet, constructed in accordance with AR 380-5, Section III, Chapter 7. The room requires an IDS.
- C. A steel entrance door, with a CD-X09 lock, minimum width of 32 inches to accommodate a cabinet is recommended. If the room is constructed as a CAA (in accordance with AR 380-5), an IPS will not be necessary.
- D. The connection to the main TR will be via a single 2-inch trade size steel conduit.
- E. All heating, ventilation, and cooling (HVAC) vents or ducts should be provided to maintain local ambient temperatures. The vents must be designed and installed in accordance with the construction requirements of AR 380-5.
- F. A communication signal ground busbar must be connected to the main TR signal busbar via properly sized ground wire (see MIL-HDBK-419-A).
- G. Additional SIPRNET closets are not required on subsequent floors or in other areas. If more distribution points are required, a large lockbox may be wall-mounted in a secondary communications closet.
- H. One dedicated 20-Ampere breaker shall be installed for the SIPRnet rack in addition to convenience outlets in the SIPRNET room. A dedicated 20- Ampere breaker for SIPRnet shall be provided in each standard (NIPRnet) TR, to support the SIPRnet distribution to network operation centers or individual drops.

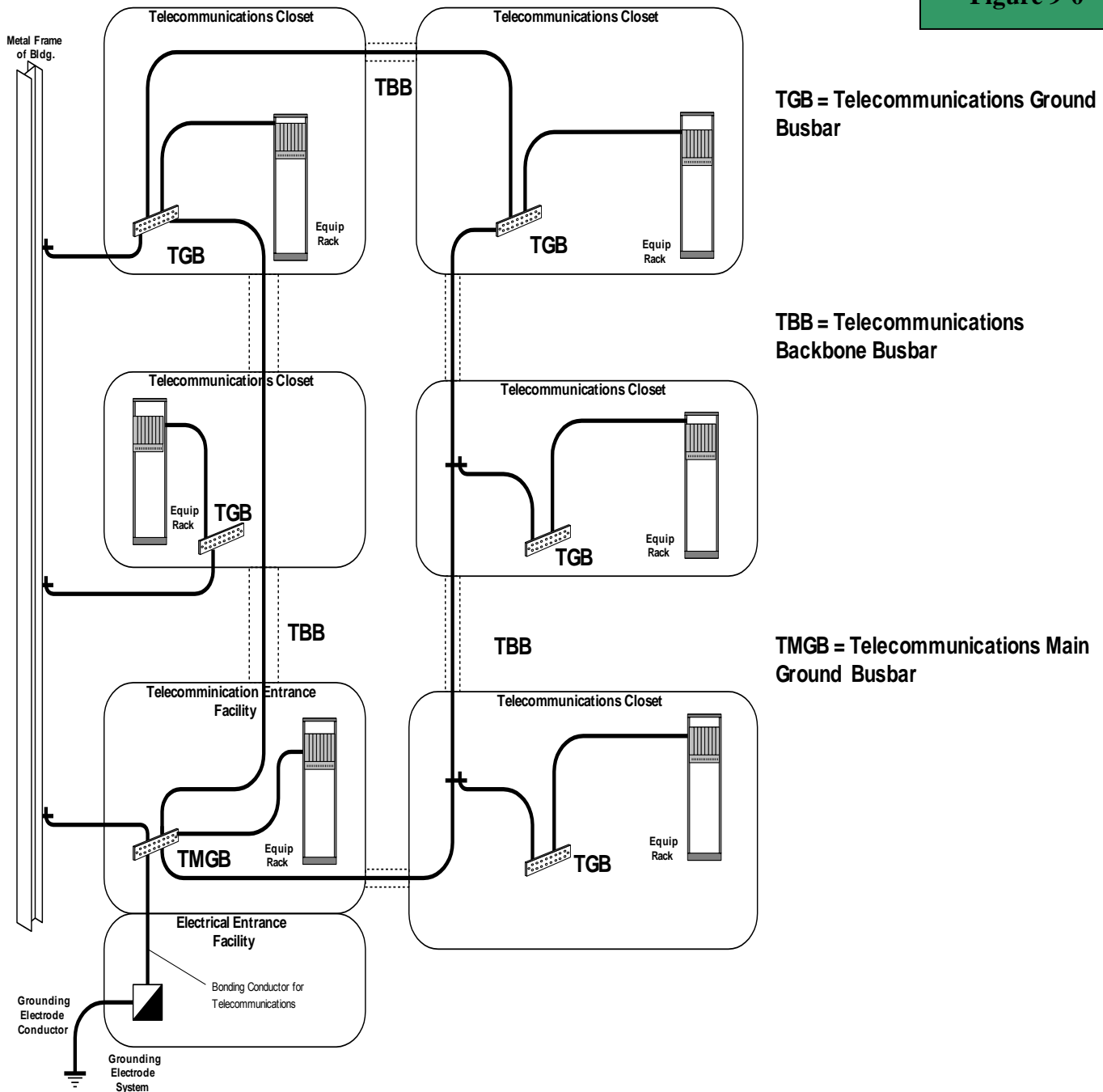
## **9.0 FACILITY BONDING AND GROUNDING – See Figure 9-0**

Bonding and grounding systems shall be configured in the telecommunications entrance facility and in each telecommunications closet (utilizing grounding busbars with standoff insulators) in accordance with EIA ANSI/TIA/EIA-607. Telecommunications Main Grounding Busbar (TMGB) shall be tied to acceptable ground source with #2 AWG wire and appropriate two-hole compression lug fittings. TMGB with standoff insulators shall be tied to the Telecommunications Ground Busbar (TGB) with #4 AWG wire and appropriate two-hole compression lug fittings. The Equipment Racks shall be bonded together using Compression Lugs and green-jacketed 6 AWG Stranded Copper. Equipment racks shall be connected to the electrical safety ground only if a separate earth ground is not available. Deviations to these standards shall be submitted to NEC-FORT BRAGG Plans and Requirements Branch (PRB) for approval. Bonding and grounding

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system shall be tested per ANSI/TIA/EIA and NEC standards. Bonding and grounding system shall be labeled per ANSI/TIA/EIA and NEC-FORT BRAGG standards.

**Figure 9-0**



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## **10.0 CABLE TAGGING AND TERMINAL STENCILING – See Figure 10-0**

### **10.1 Tag Type**

Tags shall be made of metallic (i.e. stainless steel, etc.) corrosion resistive material suitable for submersion under water and stamped with the applicable cable information identified below.

### **10.2 Tag Information**

Tag new cables and retag existing cables that are to be re-used. In the cable vault, tag each tip cable. In manholes and handholes, place a tag on each end of the cable as it enters and exits. At splice locations, place a tag on each side of the splice. In the TR, tag cable near cable entry point and at the terminal.

Tag cables as they pass through a pull box or an LB. Tag cables where they are exposed in basements. Tag cable to include cable type, cable number, cable size and type, cable count, the origin manhole or termination on the CO side and the destination manhole or termination location on the field side. Dead complements in cables will not be designated as "DD", "DP", "XDD" or any variation thereof. Identify dead complements with the appropriate "A" (or B, etc) count. Use "A" count after splice where a cable count is no longer terminated to the CO side but the cable pairs continue. Use "B" count at first appearance where same cable count is not terminated to field side and the cable pairs continue.

**Example (CO side of splice):**

C16, 12-24PF (Cable Number, Cable Size and Type)

1-1200 (Cable Count)

MH4G28 ("from MH")

**Example (Field side of splice):**

C16, 12-24PF (Cable Number, Cable Size and Type)

1-400 (Cable Count)

A, 401-600 ("A" Count past splice)

601-1200 (Cable Count)

MH4G28 ("To MH")

**Example (Field Side to Bldg):**

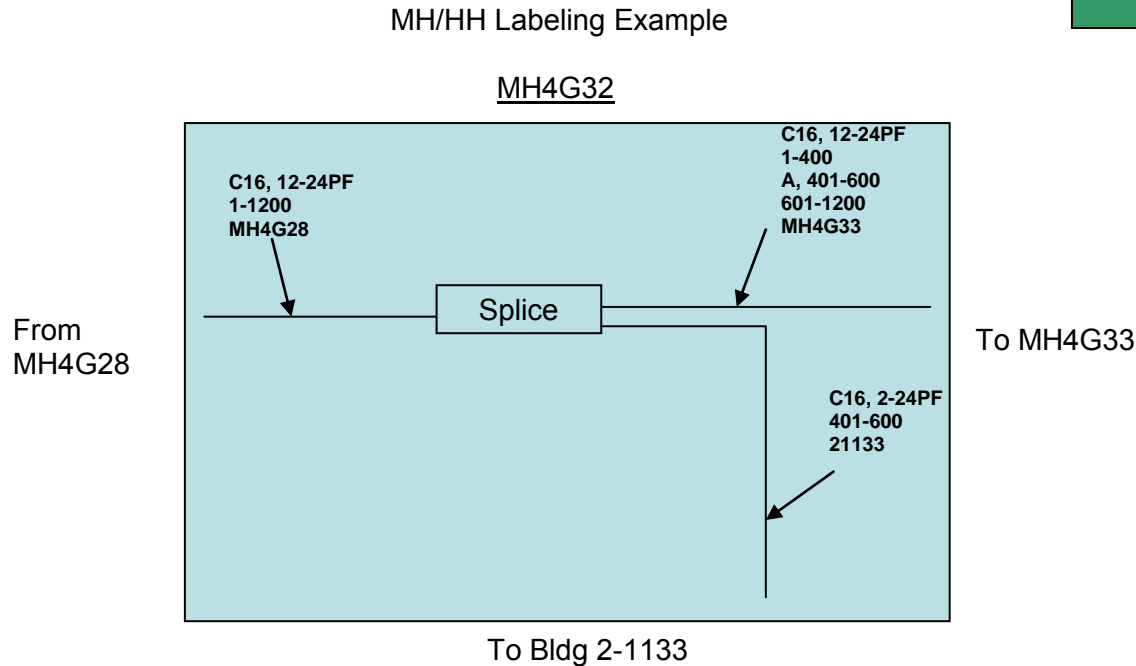
C16, 2-24PF (Cable Number, Cable Size and Type)

401-600

2-1133 ("To Building")

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**Figure 10-0**



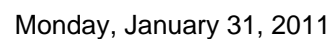
## 11.0 MANHOLES/HANDHOLES – See Figure 11-0

Refer to I3A Para 3.8.1.1 for Manhole Reference and 3.8.2 for Hand hole Reference. Per I3A Fig C-5, Manholes shall be 38YJ4 on Ft Bragg and shall contain a moveable ladder.

### 11.1 Maintenance Hole Lids

NEC-FORT BRAGG requires size 30” maintenance hole lids unless otherwise specified or approved by NEC-FORT BRAGG. Maintenance hole lids larger than the standard 30” size are extremely cumbersome when providing maintenance on Ft Bragg cable infrastructure. Ref. I3A, paragraph 3.8.1.3 (a)

### Figure 11-0





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## 12.0 SUB-DUCT/INNERDUCT

In reference to I3A Para 3.8.8, Fabric Mesh Innerduct shall be used for Fort Bragg duct and cable installations. 3 each, 3 inch, 3 cell Maxcell or equivalent must be installed with each fiber cable installation and in one of four newly installed ducts.

## 13.0 SYSTEM FURNITURE

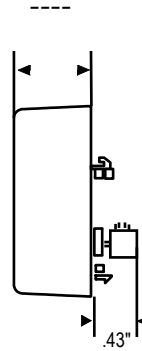
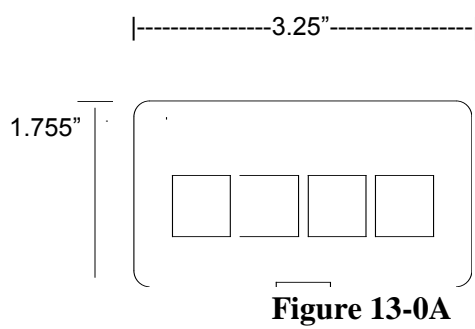
When considering System Furniture for admin spaces, the different classified systems must be taken into consideration. Power, SIPR, and NIPR could potentially be housed within the systems furniture channels. Stringent separation restrictions must be adhered to for this practice.

A systems furniture module, **figure 13-0B**, must have a separate channel for each cable category. They must enter the piece typically through a ceiling mounted power pole or underneath via a raised floor system and then channeled through the furniture.

Power is typically directed to the floor channel and is then terminated. NIPR enters through a separate power pole and is channeled to the mid "Beltline" channel and SIPR, if installed, enters in through its own power pole system and is channeled through the top channel.

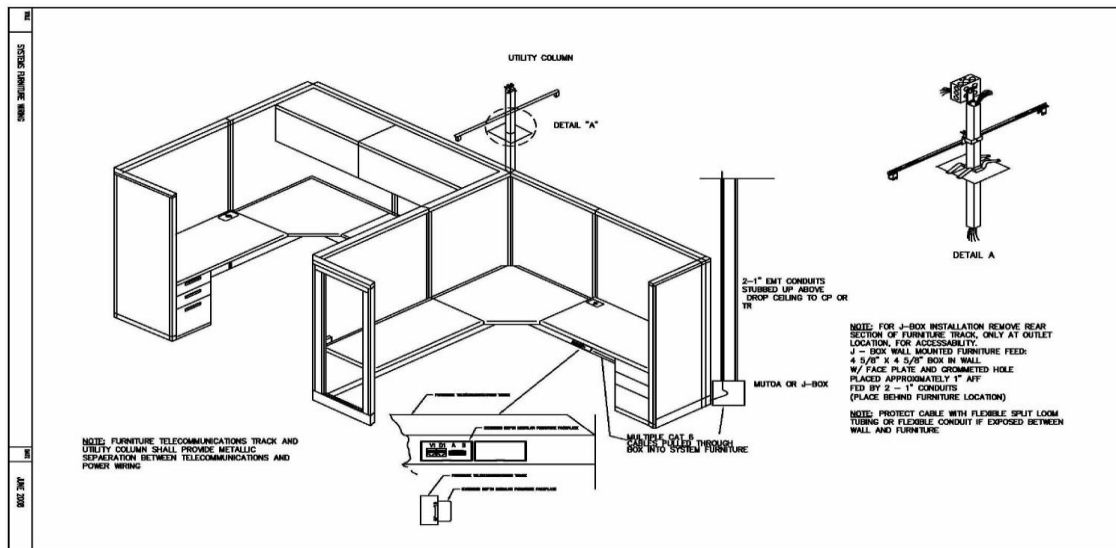
This configuration will provide all separation necessary to comply with Tempest requirements. Because of the nature of this furniture, infrastructure space is a valuable commodity that is somewhat overlooked. Extended Depth faceplates, **figure 13-0A**, when installed, ensure the proper bend radius is provided to make sure specifications are met for connectivity.

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**FACEPLATE**  
4-port only for shallow  
or powered channels  
(fits openings of  
Approximately  
1.38"x2.70")

1. **Extended-Depth: 1.80"(H) x 3.25"(W) x 1.18"(D)**
2. **Meets or exceeds all applicable standards: UL listed; complies with NEC Article 800 and TIA/EIA-568-B; and meets FCC Part 68**



**Figure 13-0B**

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**Preferred Materials List  
Table 1**

Item	Manufacturer	Part Number	Comments
Extended Depth Faceplates	Leviton	49900-E*4	4 port only for shallow channels

**OSP Preferred Materials List  
Table 2**

Item	Manufacturer	Part Number	Comments
OSP Fiber Cable – Direct Buried	Corning	SMF-28e	Double-Jacket/Single-Armor Cable, 2-288 Fibers
OSP Fiber Cable - underground	Corning	xxxEW4-T4101D20	ALTOS® All-Dielectric Gel-Free Cable, 2-288 Fibers
Buffer Fan out kit 12F		FAN-BT25-12	
Closet Connector Housing	Corning	CCH-02U	Need to order loaded with SC panels
Panel, 6 duplex SC	Corning	CCH-CP12-59	to fill CCH-02U
SC Unicam Conn	Corning	95-200-41	standard connector for Bragg
Pretium Connector Housing 4U	Corning	PCH-O4U	for ADN termination - need to order loaded with LC panels
LC Unicam Connectors	Corning	95-200-99	for termination in ADN
Fiber storage unit for Connector housing	Corning	PC4-SLK-D24	Slack storage for pretium housing
OSP Copper Cable, 25X22 pr		09-062-02	size appropriately for installation requirement
BEP, 25 pr	Marconi	F019432	size appropriately for cable pair size
Protector Modules (for BEP)	Marconi	4C1S	Carbon protectors for BEP
Stainless Steel Splice Cases	Preformed	8000630	Use appropriate size for copper or fiber. DO NOT ENCAPSULATE. Part # is example of 9.5 inch case - need to order proper size + organizer and splice trays if required
End Plate Kit, 9.5 2 section	Preformed	8003542	For re-entry of splice cases - order appropriate size
Organizer, Fiber, Vert	Preformed	8001049	order and size appropriately for splice case
Splice tray	Preformed	8001021	order and size appropriately for splice case
25 Pair splicing module	3M	3M710-SC1-25	Order amount appropriate for splice plus filler strips
MaxCell Fiber Mesh Innerduct	MaxCell	MXC3456BK5300	3 inch, 3 cell (Blk, Red and Green) stitching for subdividing OSP 4 inch conduits
		MXC3456RD5300	
		MXD3456GR5300	Detectable w/tracer wire

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**SIPR / PDS MATERIALS**

Sargent & Greenleaf Inc.	80177-102	Combination Padlock	\$109.00
Hamilton	7110-00-920-9193	Class 6 Legal Size Single Lock, 5-Drawer Capacity	\$2,313.00
Kaba Mas	CD-X09	CD-X09 combination lock	\$900.00
Performance Metal	9930-203-CB-4635-01	Lockbox, custom hinged door hasp 6.75 inch H x 5 inch D	\$70.00
Hamilton	IPS-30-39-24	Information Processing Security Container (Safe) with 19 inch rack	\$4,448.00
City Electric	664JH009.	Lockbox custom hinge and hasp	
APC UPS	PS450	APC Powerstack 450VA 1U 120V	\$239.00
3M EPOXY	<u>021200-82262-9</u>	2 Part epoxy DP 270	\$16.55
3M Epoxy Applicator	62-9744-9930-3	EPX Plus II	\$50.55
3M Epoxy Applicator	62-9164-9931-2	Mixing Nozzels	

**Table 3**

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## **APPENDIX A. GLOSSARY OF ACRONYMS AND TERMS**

AC Alternating Current  
AD Active Directory  
ARFORGEN Air Force Generation  
AR Army Regulation  
ATM Asynchronous Transfer Mode  
ATO Approval to Operate

BCT Brigade Combat Team  
Bn Battalion  
BOM Bill of Materials

CAA Controlled Access Area  
CAN Campus Area Network  
CE Compromising Emanations  
CIK Cryptographic Ignition Key  
CNSS Committee on National Security Systems  
COMSEC Communications Security  
CONUS Continental United States  
COOP Continuity of Operations Plan  
COTS Commercial Off-the-Shelf  
CSLA Communications Security Logistics Activity  
CSU Channel Service Unit  
CTTA Certified TEMPEST Technical Authority

DAA Designated Approving Authority  
DATM DISA ATM  
DIACAP DOD Information Assurance Certification and Accreditation Program  
DISA Defense Information Systems Agency  
DISN Defense Information Systems Network  
DITSCAP DOD Information Technology Security Certification and Accreditation  
DMS Defense Message System  
DoA Department of the Army  
DOD Department of Defense  
DPW Director of Public Works  
DSAWG DISN Security Accreditation Working Group  
DSS Defense Security Services  
DSU Digital Service Unit  
DTD Data Transfer Device  
DTC Divisional Tactical Operations Center  
DVS-G Defense Video Services - Global

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## **APPENDIX A. GLOSSARY OF ACRONYMS AND TERMS**

EKMS Electronic Key Management System

EMT Electrical Metallic Tubing

EUB End User Building

FDED Fort Detrick Engineering Directorate

GCCS Global Command and Control System

GEM General Dynamics Encryptor Manager

GIG Global Information Grid

GSA General Services Administration

HAIPE High Assurance Internet Protocol Encryptor

HHC Headquarters, Headquarters Company

HQ Headquarters

IA Information Assurance

IDS Intrusion Detection System

IMO Information Management Officer

IMR Initial Modification Request

INE In-Line Network Encryptor

INFOSEC Information Security

IOT&E Initial Operational Test and Evaluation

IP Internet Protocol

IPS Information Processing System

IPv6 Internet Protocol Version 6

IS Interoperability Specification

ISDN Integrated Services Digital Network

LCA Limited Control Access (also Limited Control Area)

LOM List of Materials

MAC Mission Assurance Category

Mbps Megabits per second

MOA Memorandum of Agreement

MSE Mobile Subscriber Equipment

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## **APPENDIX A. GLOSSARY OF ACRONYMS AND TERMS**

NES Network Encryption Solution  
NETCOM Network Enterprise Technology Command  
NIPRNET Non-Classified but Sensitive Internet Protocol Router Network  
NOFORN Not Releasable to Foreign Nationals/Governments/Non-US Citizens  
NSA National Security Agency  
NSI National Security Information  
NSTISS National Security Telecommunications and Information Systems Security  
NSTISSAM National Security Telecommunications and Information Systems Security Advisory Memorandum

OCONUS Outside Continental United States

PC Personal Computer  
PCMCIA Personal Computer Memory Card International Association  
PDS Protected Distribution System  
PM Program Manager  
POC Point of Contact  
POM Personnel Operations and Maintenance  
PoP Point of Presence  
PPK Pre-placed Key  
PPP Power Projection Platform  
PSP Power Support Platform

QoS Quality of Service

RF Radio Frequency  
RFS Request for Service

S Secret  
SA Systems Administrator  
SCAO SIPRNET Connection Approval Office  
SCCPG SIPRNET Customer Connection Process Guide  
SIPRNET Secret Internet Protocol Router Network  
STIG Security Technical Implementation Guide  
SVN Secure Virtual Network

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**APPENDIX A. GLOSSARY OF ACRONYMS AND TERMS**

TA Technical Authority  
TACE Technical Analysis and Cost Estimate  
TACLANE Tactical LAN Encryptor  
TAR Technical Acceptance Recommendation  
TCP Transmission Control Protocol  
TLA Top Level Architecture  
TOC Tactical Operations Center  
TS Top Secret  
TS/SCI Top Secret / Sensitive Compartmentalized Information  
TSO Telecommunications Service Order  
  
UAA Uncontrolled Access Area  
UL Underwriters Laboratory  
UPS Uninterruptible Power Supply  
  
VLAN Virtual Local Area Network  
VoIP Voice over Internet Protocol  
  
WAN Wide Area Network



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## APPENDIX B. REFERENCES

1. ANSI/TIA/EIA-568-B.1 Commercial Building Telecommunications Cabling Standard, Part 1: General Requirements
2. ANSI/TIA/EIA-568-B.2 Commercial Building Telecommunications Cabling Standard, Part 2: Balanced Twisted Pair Cabling Components
3. ANSI/TIA/EIA-568-B.2 –1 Addendum 1 – Transmission Performance Specifications for 4-pair 100-ohm Category 6 Cabling
4. ANSI/TIA/EIA-568-B.2–4 Addendum 4 - Solderless Connection Reliability Requirements for Copper Connecting Hardware
5. ANSI/TIA/EIA-568-B.3 Commercial Building Telecommunications Cabling Standard, Part 3: Optical Fiber Cabling Components
6. ANSI/TIA/EIA-568-B.3-1 Addendum 1 –Additional Transmission Performance Specifications for 50/125 Optical Fiber Cables
7. ANSI/TIA/EIA-569-B Commercial Building Standard for Telecommunications Pathways and Spaces
8. ANSI/TIA/EIA-526-7 Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant
9. ANSI/TIA/EIA-526-14A Measurement of Optical Power Loss of Installed Multimode Fiber Cable Plant
10. ANSI/TIA/EIA-606-A Administrative Standard for the Telecommunications Infrastructure of Commercial Buildings
11. ANSI-J-STD-607-A-2002, Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications, Telecommunications Industry Association (TIA), October 2002.
12. EN 50173:1996 Information Technology – Generic Cabling Systems
13. EN 50174-1:2001 Information Technology – Cabling Installation, Part 1: Specification and Quality Assurance
14. EN 50174-2:2001 Information Technology – Cabling Installation, Part 2: Installation Planning and Practices Inside Buildings
15. EN 50174-3:2002 DRAFT Information Technology – Cabling Installation, Part 3: Installation Planning and Practices Outside Buildings
16. ISO/IEC 11801:2002 Information Technology – Generic Cabling for Customer Premises
17. ISO/IEC 14763-1:1999 Information Technology – Implementation and Operation of Customer Premises Cabling, Part 1: Administration
18. ISO/IEC 14763-2:2000 Information Technology – Implementation and Operation of Customer Premises Cabling, Part 2: Planning and Installation
19. ISO/IEC 14763-3:2000 Information Technology – Implementation and Operation of Customer Premises Cabling, Part 3: Testing of Optical Fiber Cabling

### B-1

Contractor Installation Design Guide (IDG) for  
Communications Infrastructure Requirements, March 2009

## APPENDIX B. REFERENCES

20. NFPA 70, National Electrical Code, 2002 Edition, National Fire Protection Association, Inc., August 2001.
21. NFPA 780, Standard for the Installation of Lightning Protection Systems, latest issue
22. C2-2002, National Electrical Safety Code, 2002 Edition, Institute of Electrical and Electronics Engineers, Inc., August 2002.
23. MIL-STD-188-124B, Grounding, Bonding and Shielding for Common Long Haul/Tactical Communication Systems Including Ground Based Communications- Electronics Facilities and Equipments.
24. MIL-HDBK-419A, Grounding, Bonding, and Shielding For Electronic Equipments and Facilities.
25. UFC 1-300-01 Criteria Format Standard
26. UFC 3-580-10 Design: Navy And Marine Corps Intranet (NMCI) Standard Construction Practices Information System (IS)
27. UFGS-16710 09/2004, Structured Telecommunications Cabling and Pathway System.
28. ETL 1110-3-502 - Telephone and Network Distribution System Design and Implementation Guide (Installation Information Infrastructure Architecture (I3A) Design and Implementation Guide).
29. MIL HDBK 1012/3 - Telecommunications Premises Distribution Planning, Design, and Estimating
30. Building Industry Consulting Service International (BICSI) telecommunications distribution methods manual
31. BBP 03-EC-0-0001: Acquiring Secret Internet Protocol Router Network (SIPRNET) Connectivity: Version 1.0
32. AR 25-2, Information Assurance
33. AR380-5, Information Security Program
34. AR380-40, Policy for Safeguarding and Controlling Communications Security – (COMSEC) Material
35. Army Regulation 381-14; Military Intelligence, Technical Counterintelligence, (C)

# **APPENDIX LL**

## **TRAFFIC SIGNALS**

## FORT BRAGG, NORTH CAROLINA TRAFFIC SIGNALS

17 June 2010

### A. GENERAL REQUIREMENTS

1. The Design-Build Contractor shall be responsible for designing, procuring, and installing traffic signals at two intersections. Traffic signals equipment shall be installed at the intersection of Butner and Keerans and at the intersection of Butner and Spooner. New traffic signals, traffic signal wiring, and all other components installed shall be compatible to the existing traffic signal control system. The new traffic signal poles and arms shall match the existing poles and arms.

2. All coordination including exchanges of information between the Design-Build Contractor and the installation DPW, NEC, the privatized electric utility company, the local CATV company information and other utility entities shall be routed through the Contracting Officer's Representative (COR) unless otherwise directed. The Fort Bragg Installation Civil Engineer shall have the final approval of the design.

The Fort Bragg Installation Civil Engineer shall have the final approval of the design. All coordination including exchanges of information and design approval between the Design-Build Contractor and the installation Civil Engineer shall be routed through the Contracting Officer's Representative (COR) unless otherwise directed.

3. All requirements within this appendix apply to the design and construction whether specifically referenced in section 01 10 00 or not.

4. All traffic signal systems shall comply with the North Carolina DOT.

5. All traffic signal systems shall comply with Fort Bragg Directorate of Public Works Traffic Engineering Installation Design Guidelines:

#### 6.3.9 (Traffic Signals, Roadway Marking and Signage)

##### 6.3.9.1

All traffic signal designs for Fort Bragg, North Carolina shall be prepared by a Professional Traffic Engineer (PE) licensed and bonded to work in the State of North Carolina, to perform this type of work. All traffic signal work ( New and Maintenance) shall be performed by an approved traffic signal contractor by NCDOT and work installed and inspected by a certified IMSA Level 2 Traffic Signal Technician in the state of North Carolina. These technicians shall be bonded either individually or thru their company to certify compliant work performance associated with all policies and standards. All signal equipment to be used shall comply with the NCDOT Project Special Provisions (version 06.6) and Intelligent Transportation Systems. The plans shall specify that all equipment used shall be listed on the current NCDOT approved QPL (Qualified Products List). The plans shall specify the use of a 2070L type signal controller listed on the NCDOT QPL. No

deviation from this policy shall occur unless approved by the Fort Bragg Civil or Traffic Engineer. The design shall comply with all policies and guidelines relative to the design listed in the following manuals:

1. Manual of Uniform Traffic Control (MUTCD)
2. FHWA – Railroad- Highway Grade Crossing Handbook and the Unified Facilities Criteria (UFC) Railroad Track Maintenance & Safety Standards.
3. North Carolina Department of Transportation (NCDOT) Signals and Geometric Design Manual.
4. North Carolina Department of Transportation (NCDOT) Roadway Standard Drawings (The ITE and ASTM standards).
5. North Carolina Department of Transportation (NCDOT) Roadway Design Manual Section 1 and 2.
6. North Carolina Department of Transportation (NCDOT) Highway Guidelines Consultants.
7. Signal and Geometrics Section Design Manual 11.
8. Traffic Signal Operations and Maintenance Practices Report.
9. Project Special Provisions for Traffic Signals (version 06.6).
10. National Electric Safety Code

The Fort Bragg Installation Civil Engineer shall have the final approval of the design.

#### 6.3.9.2

All pavement marking shall be designed in compliance with MUTCD and the current NCDOT standard drawing s and specifications. The project shall specific Thermo plastic (Extruded) material or heated in place Thermo Plastic material in compliance with NCDOT standard specifications. The product must be on the NCDOT QPL list for asphalt surface courses. Polurea material shall be used on concrete bridge or roadways per NCDOT standard specifications and on the NCDOT approved QPL.

#### 6.3.9.3

The contractor shall comply with the NCDOT TIME LIMITIATIONS for placement and replacement of pavement markings.

#### 6.3.9.4

All pavement markers shall be in conformance with MUTCD and the current NCDOT standard drawing s and specifications, unless otherwise changed by the Installation Civil Engineer and or Traffic Engineer. The project shall specify the use of “snow plowable” pavement markers of a type approved on the NCDOT QPL.

The Fort Bragg Installation Civil Engineer and or Traffic Engineer shall have the final approval of the design.

#### 6.3.9.5

The installation of this material and associated work shall be in compliance with either the MUTCD or NCDOT design policies or practices. If applicable, the contractor may be

required to provide a traffic control plan signed and sealed by a licensed Professional Traffic Engineer in the State of North Carolina at the discretion of the Fort Bragg Installation Civil Engineer shall have the final approval of the design.

#### 6.3.9.6

All roadway signing used on Fort Bragg shall be in compliance with MUTCD and current NCDOT standards drawings and specifications. All material must be on the NCDOT approved QPL (Qualified Products List).

1. Regulatory, Warning and Guide Signs: All regulatory and guide signs shall be fabricated with Type III “high intensity” sheeting. All warning signs, except for school zones, bicycle, pedestrian, and highway-rail grade crossing warning signs shall be fabricated with Type III “high intensity” sheeting. The color of the sheeting shall be as specified in the MUTCD.
2. School Zone, Bicycle Pedestrian and Highway Rail Grade Crossing Warning Signs: It is standard practice of NCDOT to install and maintain all school zone, bicycle, pedestrian, and highway-rail grade crossing warning signs using Type IX “high intensity” sheeting. All school zones, bicycle, and pedestrian warning signs shall be “high intensity” fluorescent yellow-green. All highway-rail crossing advance warning signs shall be “high intensity” fluorescent yellow.
3. Temporary Traffic Control Work Zone Warning Signs: It is standard practice of the NCDOT, and for all agencies that work by contract for the NCDOT, to install and maintain all traffic control work zone warning signs both stationary and portable work zones signs using TYPE VII, VIII, or IX “high intensity” fluorescent orange sheeting. A portable roll up sign (without adhesive backing) shall have the retro-reflective value of Type VII, VIII, or IX “high intensity” fluorescent orange sheeting. Again, the Fort Bragg Civil and or Traffic Engineer shall require a traffic control plan prepared and sealed by a Professional Traffic Engineer licensed in the State of North Carolina to perform this design.

The Fort Bragg Installation Civil Engineer and or Traffic Engineer shall have the final approval of the design.

## B. FORT BRAGG TRAFFIC CONTROL AND WORKZONE SAFETY POLICY

The Contractor shall maintain traffic during construction and provide, install, and maintain all traffic control devices in accordance with these project guidelines, the Project Special Provisions, North Carolina Department of Transportation Standard Specifications for Roads and Structures 2006, and the current edition of the Manual of Uniform Traffic Control Devices (MUTCD).

The Contractor shall utilize complete and proper traffic controls and traffic control devices during all operations. All traffic control and traffic control devices required for any operation shall be functional and in place prior to the commencement of that operation. Signs for temporary operations shall be removed during periods of inactivity. The Contractor is required to leave the project in a manner that will be safe to the traveling public and which will not impede motorists.

Traffic movements through lane closures on roads with two way traffic shall be controlled by flaggers stationed at each end of the work zone. In situations where sight distance is limited, the Contractor shall provide additional means of controlling traffic, including, but not limited to, two-way radios, pilot vehicles, or additional flaggers. Flaggers shall be competent personnel, adequately trained in flagging procedures, and furnished with proper safety devices and equipment, including, but not limited to, safety vests and stop/slow paddles.

All personnel when working in traffic areas or areas in close proximity to traffic shall wear an approved safety vest, or shirt or jacket which meets the color requirements of the Manuel of Uniform Traffic Control Devices (MUTCD).

The Contractor shall comply with all applicable Federal, State, and local laws, ordinances, and regulations governing safety, health, and sanitation, and shall provide all safeguards, safety devices, and protective equipment, and shall take any other needed actions, on his own responsibility that are reasonably necessary to protect the life and health of employees on the job and the safety of the public, and to protect property in connection with the performance of the work covered by the contract.

Work on any roadway, parking lot or exposed traffic movement area may require a traffic control plan. The plan shall incorporate the applicable MUTCD and NCDOT standards and sealed by a professional Traffic Engineer licensed in the state of North Carolina. A deviation from this directive, requiring a sealed traffic control plan can be made based on emergency ,safety and roadway conditions by the Fort Bragg, DPW Civil and or Traffic Engineer.

The Fort Bragg Civil Engineer, Mr. Darryl Butler requires a fourteen day notice to begin work for security and inter-agency approvals. Exceptions to the schedule may be granted for emergency situations.

The Contractor shall provide written notice to the Civil Engineer at the start and projected completion date to this work. Any deviation for this schedule shall be approved by the Civil Engineer.

Open cuts on asphalt roadways will require full depth patching with applicable base, full depth patching with Asphalt Concrete Surface Course type SF9.5A in 2 inch lifts if applicable, the same day. The work shall also comply with NCDOT Standard roadway repair and patching policies and techniques.

No material storage shall be allowed along the shoulders of the roadway, parking lots or areas with active traffic during non-working hours. Equipment shall be parked away from active traffic areas and shall be properly barricaded to prevent equipment obstruction within the clear recovery area. The Contractor shall comply with all OSHA requirements and provide a competent person on site to supervise all phases of this type of work.

The Contractor shall comply with all federal, state, and Fort Bragg environmental regulations and shall obtain all necessary federal, state, and Fort Bragg environmental permits, including but not limited to, those related to sediment control, storm water, wetland, streams, endangered species and historical sites.

The Fort Bragg Department of Public Works shall be notified prior to beginning work that affects permanent traffic control devices. The Contractor shall be responsible to relocate, modify, repair or replace traffic signals and component equipment, traffic signs and pavement markings in compliance with NCDOT current equipment and standards where applicable. The Contractor may be required to install temporary traffic signals, pavement markings, raised pavement markers and signing to accomplish the work. These tasks shall be noted in the approved traffic control plan.

It shall be the responsibility of the Contractor to determine the location of the other utilities within the work zone area. This shall also include the location of the water, sewer and drainage systems. The Contractor shall be responsible for notifying other utility owners and providing protection and safeguards to prevent damage or interruptions to existing facilities and to maintain accessibility to the existing utilities. The Contractor shall be responsible for the repair or replacement of these utilities because of his work. All pipe repair work shall be in compliance with the NCDOT Standard Drawings and specifications, current edition.

Excavated area adjacent to pavement or active traffic areas having more than a 2 inch drop shall be shaped up at a 6:1 or flatter slope and designated by appropriate delineation during periods of inactivity, including, but not limited to, night and weekend hours. Pre-cast concrete manholes, catch basins, or drainage structures shall be the type pre-approved by NCDOT.

Manhole rings and covers, valve covers and storm drainage grates and frames shall be of the traffic bearing type approved by NCDOT.

#### C. EXISTING TRAFFIC SIGNAL AT BUTNER AND KEERANS GENERAL REQUIREMENTS

1. Remove and relocated existing traffic signal equipment at the intersection of Butner and Keerans. Existing traffic equipment shall include but is not limited to vehicle traffic signals, pedestrian signals, control boxes, traffic signal poles, pole foundations, traffic signal wiring, induction loops, etc. See Drawing CD103 for approximate locations of the traffic signal equipment.



2. The Design-Build Contractor shall replace Pole A. New poles and arms shall match the existing poles and arms. See plate ES-602.
3. Install a new right traffic signal on Pole B. New traffic signal shall match the existing traffic signal. New traffic signals shall be compatible to the existing traffic signal control unit. See plate ES-602.

#### D. NEW TRAFFIC SIGNAL AT BUTNER AND SPOONER GENERAL REQUIREMENTS

1. Provide a new traffic signal system at the intersection of Butner and Spooner. New poles and arms shall match the existing poles and arms located at the intersection of Butner and Keerans. See plate ES-602.
2. Provide new traffic signal equipment. New traffic equipment shall include but is not limited to vehicle traffic signals, pedestrian signals, control boxes, traffic signal poles, pole foundations, traffic signal wiring, induction loops, etc. New equipment shall be compatible the installations existing traffic control system.

Paragraph 6.4.6.8. Telephone Service (Private Company): Delete paragraph in its entirety and substitute 6.4.6.8. Deleted.

Add Paragraph 6.9.7:

#### 6.9.7 Environmental Requirements for Telecommunications Rooms

Telecommunications rooms shall comply with the requirements of ANSI/TIA/EIA-569-B. Environmental conditions shall be maintained at the Class 1 and 2 Recommended Operating Environment. Before being introduced in the telecommunications room, outside air shall be filtered and pre-conditioned to remove particles with the minimum MERV filtration quality shown in the ASHRAE HVAC Applications, Chapter 17. Rooms shall be maintained under positive pressure relative to surrounding spaces. Computer room air conditioning units shall be specifically designed for telecommunications room applications and shall be built and tested in accordance with the requirements of ANSI/ASHRAE Standard 127. A complete air handling system shall provide ventilation, air filtration, cooling and dehumidification, humidification (as determined during the design phase), and heating. The system shall be independent of other systems and shall be required year round. With its product data transmittals, the Contractor shall submit a written statement identifying the country of origin and manufacture and certifying compliance with the Buy American Act (Clause 52.225-9) or Trade Agreements Act (Clause 52.225-11), whichever applies, for the air handling system and condenser unit in accordance with appropriate provisions in SECTION 00 45 00, REPRESENTATIONS, CERTIFICATIONS, AND OTHER STATEMENTS OF BIDDERS/OFFERORS and procedures indicated in SECTION 01 33 00, SUBMITTAL PROCEDURES.

Add following sentence to Paragraph 6.18: Building number A4638 is located at Keerans (Goram) St and Deglopper St. The asbestos and hazardous building surveys are in Appendix AA.

## **\*4 APPENDIX NN**

**SECTION 01 83 16**  
**(Requirements of this section are**  
**MANDATORY for this project)**

**SECTION 28 16 00.00 20**

(Added by RFPLetter\_R4)

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## SECTION 01 83 16

\*4 EXTERIOR ENCLOSURE PERFORMANCE REQUIREMENTS  
12/10

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## ASTM INTERNATIONAL (ASTM)

ASTM C 1060	(2003) Standard Practice for Thermographic Inspection of Insulation Installations in Envelope Cavities of Frame Buildings
ASTM C 1153	(2003e1) Standard Practice for Location of Web Insulation in Roofing Systems Using Infrared Imaging
ASTM E 1186	(2009) Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems
ASTM E 779	(2003) Standard Test Method for Determining Air Leakage Rate by Fan Pressurization
ASTM E 1677	(2005) Standard Specification for an Air Retarder (AR) Material or System for Low-Rise Framed Building Walls
ASTM E 1827	(2007) Standard Test Methods for Determining Airtightness of Buildings Using an Orifice Blower Door

## INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ISO 6781	(1983) Thermal Insulation - Qualitative Detection Of Thermal Irregularities In Building Envelopes - Infrared Method
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## 1.2 AIR BARRIER SYSTEM

The airtight components of the building envelope and the joints, junctures and transitions between materials, products, and assemblies forming the air-tightness of the building enclosure are called "the air barrier system." Services include coordination between the trades, the proper scheduling and sequencing of the work, preconstruction meetings, inspections, tests, and related actions, including reports performed by Contractor, by independent agencies, and by governing authorities.

## 1.3 CHARACTERISTICS

Ensure that the intent of constructing the building enclosure with a continuous air barrier system to control air leakage into, or out of the

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conditioned space is achieved. The air barrier system shall have the following characteristics:

- a. It must be continuous, with all joints sealed.
- b. It must be structurally supported to withstand positive and negative air pressures applied to the building enclosure.
- c. Connection shall be made between:
  1. Foundation and walls, including penetrations, ties and anchors.
  2. Walls, windows, curtain walls, storefronts, louvers and doors.
  3. Different wall assemblies, and fixed openings with those assemblies.
  4. Wall and roof connections.
  5. Wall and roof over unconditioned space.
  6. Walls, floor and roof across construction, control and expansion joints.
  7. Walls, floor and roof to utility, pipe and duct penetrations.
  8. Floor over unconditioned space.
  9. Junctures, abutment, and connections or overlaying with air barrier materials by different manufacturers.
  10. Seismic and expansion joints.
  11. All other leakage pathways in the building envelope.
- d. All penetrations of the air barrier and pathways of air infiltration/exfiltration shall be made air-tight and shall have the following properties:
  1. Air Penetrations: 0.004 cubic feet per minute per square foot under a pressure differential of 0.3 inch water gauge (1.57 pounds per square foot) (0.02 liters per second per square meter at 75 Pascals) when tested according to [ASTM E 2178](#). Type I per [ASTM E 1677](#).
  2. Water Vapor Transmission: 13 perms or less when tested according to [ASTM E 96](#), Method B.
  3. Surface Burning Characteristics: Class A when tested in accordance with [ASTM E 84](#). Flame Spread: 10, Smoke Developed: 10.
  4. Air Infiltration Barrier system shall be wrapped/sealed tight to all items that penetrate the building exterior closure.
  5. Air Infiltration Barrier shall be continuous, applied to the face of exterior gypsum board sheathing on exterior wall, onto exterior soffit and fascia, and onto roof insulation.

#### 1.4 MATERIAL PERFORMANCE REQUIREMENTS

##### 1.4.1 Materials

Provide materials which have an air permeance not to exceed 0.004 cubic feet per minute per square foot under a pressure differential of 0.3 inch water gauge (1.57 pounds per square foot) (0.02 liters per second per square meter at 75 Pascals) when tested according to [ASTM E 2178](#), and a vapor permeance of 0.1 perms or less when tested according to [ASTM E 96](#).

##### 1.4.2 Assemblies

Assemblies of materials and components shall have an air permeance not to exceed 0.06 cubic feet per minute per square foot under a pressure differential of 0.3 inch water gauge (1.57 psf) (75 Pa) when tested

according to [ASTM E 1677](#). Air leakage of window, skylight and door assemblies that are part of the building envelope shall be determined in accordance with AAMA/WDMA/CSA 101/I.S.2/A440, or NFRC 400 by an accredited, independent laboratory, and labeled and certified by the manufacturer. Windows and skylight air leakage shall not exceed 0.02 cubic feet per minute per square foot under a pressure differential of 0.3 inch water gauge, or 0.3 cubic feet per minute per square foot under a pressure differential of 6.54 psf (300 Pa). Door assembly air leakage shall not exceed 0.3 cubic feet per minute per square foot at for all other products at 1.57 psf (75 Pa). Exception: Overhead doors shall be permitted to use air leakage as determined by test at standard test conditions in accordance with [ANSI/DASMA 105](#).

#### 1.4.3 Outdoor Air Intakes and Exhaust Openings

Stair and elevator shaft vents and other outdoor air intakes and exhaust openings integral to the building envelope shall be equipped with not less than a Class I motorized, leakage-rated damper with a maximum leakage rate of 4 cubic feet per minute per square foot at 1.0 inch water gauge (26 psf) (1250 Pa) when tested in accordance with [AMCA 500D](#). These air tight, operable dampers shall be installed when the air barrier is penetrated by:

- a. Fixed open louvers such as in elevator shafts and machine rooms.
- b. Mechanical system components which allow infiltration or exfiltration of air when the systems are inactive, such as atrium smoke exhaust systems, elevator shaft smoke relief openings, and other similar elements.

Such dampers shall be set in the closed position and automatically open upon:

1. the activation of any fire alarm initiating device of the building's fire alarm system;
2. the interruption of power to the damper.

Exception: Gravity (non-motorized) dampers are permitted to be used in buildings less than three stories in height above grade.

#### 1.4.4 Building

Air leakage of the entire building shall not exceed 0.25 cubic feet per minute per square foot under a pressure differential of 0.3 inch water gauge (1.57 psf) (75 Pa) when tested according to [ASTM E 779](#).

### 1.5 PROJECT CONDITIONS

#### 1.5.1 Temperature

Install air and vapor barrier within range of ambient and substrate temperatures recommended by air and vapor barrier manufacturer. Do not apply air and vapor barrier to a damp or wet substrate.

#### 1.5.2 Field Conditions

Do not install air and vapor barrier in snow, rain, fog, or mist. Do not install air and vapor barrier when the temperature of substrate surfaces and surrounding air temperatures are below those recommended by the manufacturer.

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## 1.6 WARRANTY

### 1.6.1 Material Warranty

Provide manufacturer's standard product warranty for a minimum 3 years from date of Substantial Completion.

### 1.6.2 Installation Warranty

Provide installer's 2-year warranty from date of Substantial Completion, including all components of the air and vapor barrier assembly, against failures including loss of air tight seal, loss of watertight seal, loss of adhesion, loss of cohesion, failure to cure properly.

## 1.7 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.

### SD-01 Preconstruction Submittals

Testing and Inspection Plan; G, RO

Report of potential deficiencies; G, RO

### SD-05 Design Data

Test Documentation; G, RO

Submit not later than 60 days after Notice to Proceed.

### SD-06 Test Reports

Written reports of each test shall include, but are not limited to, the following:

- a. Date of Issue
- b. Project title and number
- c. Name, address, and telephone number of testing agency
- d. Dates and locations of samples and tests or inspections
- e. Names of individuals making the inspection or test
- f. Designation of the Work and test method
- g. Identification of product and Specification Section
- h. Complete inspection or test data
- i. Test results and an interpretation of test results
- j. Ambient conditions at the time of sample taking and testing
- k. Comments or professional opinion on whether inspected or tested Work complies with Contract Document requirements
- l. Name and signature of laboratory inspector
- m. Recommendations on retesting

### Building Airtightness Test; G, RO

Submit five copies of the certified written report from inspection and testing agency of each test not later than 10 days after each test.

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### Thermography Test; G, RO

Submit five copies of the certified written report from inspection and testing agency of each test not later than 10 days after each test.

### SD-07 Certifications

#### Qualifications of Testing Entity; G, RO

#### 1.8 QUALITY ASSURANCE

##### 1.8.1 Building Air Tightness Test Firm Qualifications

The testing firm shall have minimum 2 years experience in air tightness testing and analysis, with a minimum of three successful projects of similar type and scope in the previous 3 years, using the specified testing standard, and employing qualified test technicians.

##### 1.8.2 Building Air Tightness Test Technician Qualifications

The testing technician shall have 2 years experience in air tightness testing using the specified testing standard and equipment.

##### 1.8.3 Thermography Test Firm Qualifications

The testing firm shall have minimum 2 years experience in thermographic testing and analysis, with a minimum of three successful projects of similar type and scope in the previous 3 years, using the specified testing standard, and employing qualified test technicians under the supervision of a Level III Certified Infrared Thermographer.

The testing firm shall be the same firm that provides building airtightness testing for the project. The testing firm shall be capable of coordinating testing procedures, analysis, recommendations, and reporting.

##### 1.8.4 Thermography Test Technician Qualifications

The testing technician shall be a Level II Certified Infrared Thermographer and shall have 2 years experience in thermographic testing using the specified testing standard and equipment.

##### 1.8.5 Certifications

Infrared Thermography Certifications shall be by the Infrared Training Center, N. Billerica, MA, or a comparable training organization acceptable to the Contracting Officer.

##### 1.8.6 Subcontractor Coordination

Requirements of this section apply to the coordination between subcontractors required to provide an airtight building enclosure, customized fabrication and installation procedures, not production of standard products including but not limited to:

- a. Continuity of the air barrier materials and products with joints to provide assemblies. Continuity of all the enclosure assemblies with joints and transition materials to provide a whole building air barrier system.



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b. Specific quality-control requirements for individual construction activities are specified in the sections of the specifications. Requirements in those sections may also cover production of standard products. Each subcontractor shall adequately and satisfactorily perform the quality assurance documentation, tests and procedures required by each section.

#### 1.9 FIELD CONDITIONS

Perform testing under conditions stipulated in test standards, instrument manufacturer's instructions, and this Section.

##### 1.9.1 Building Airtightness Test

Perform testing under the following ambient environmental conditions:

- a. Windspeed: Not greater than 4 mph
- b. Outside Air Temperature: Between 41 and 95 deg. F

##### 1.9.2 Thermography Test

Perform testing on dry building surfaces after sunset and prior to sunrise under the following environmental conditions:

- a. Windspeed: Not greater than 15 mph
- b. Outside Air Temperature: At level to present differential with building interior temperature of 18 deg F minimum, for minimum of 4 hours prior to test, and not varying more than 30 percent during duration of testing.
- c. Indoor Air Temperature: At constant temperature varying not more than 4 deg. F
- d. Direct Solar Exposure of Surfaces: No direct solar radiation on inspected surfaces during and for minimum 4 hours prior to inspection for frame construction, 8 hours for masonry veneer construction, at acceptable outside air temperature.

#### PART 2 PRODUCTS

##### 2.1 PRODUCTS

###### 2.1.1 Product Data

Submit manufacturer's product data, manufacturer's printed instructions for evaluating, preparing, and treating substrate, temperature and other limitations of installation conditions, technical data, and tested physical and performance properties.

- a. Submit letter from primary materials manufacturer indicating approval of products not manufactured by primary manufacturer.
- b. Include statement that materials are compatible with adjacent materials proposed for use.
- c. Submit reports indicating that field peel-adhesion test on all

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materials to which sealants are adhered have been performed and the changes made, if required, to other approved materials, in order to achieve successful adhesion.

## 2.1.1.2 Samples

Submit clearly labeled samples, 3- by 4-inch (75 mm by 100 mm) minimum size of each material proposed.

## 2.1.1.3 Shop Drawings of Test Chamber

Submit shop drawings of proposed test chamber showing plans, elevations, large-scale details, and connections to the test apparatus.

## 2.1.1.4 Field Test Results of Test Chamber

Submit test results of air leakage test (and water leakage test) of test chamber in accordance with specified standards, including retesting if initial results are not satisfactory.

## 2.1.1.5 Shop Drawings

Submit shop drawings showing locations and extent of air and vapor barrier assemblies and details of all typical conditions, intersections with other envelope assemblies and materials, membrane counter-flashings, and details showing how gaps in the construction will be bridged, how inside and outside corners are negotiated, how materials that cover the air and vapor barrier are secured with air-tight condition maintained, and how miscellaneous penetrations such as conduits, pipes, electric boxes and similar items are sealed.

- a. Include VOC content of each material.
- b. Include statement that materials are compatible with adjacent materials proposed for use.
- c. Include recommended values for field adhesion test on each substrate.

## 2.1.1.6 Compatibility

Submit letter from manufacturer stating that materials proposed for use are permanently chemically compatible and adhesively compatible with adjacent materials proposed for use. Submit letter from manufacturer stating that cleaning materials used during installation are chemically compatible with adjacent materials proposed for use.

## PART 3 EXECUTION

## 3.1 EXAMINATION

Certify that building exterior enclosure systems, subsystems, and construction have been completed in accordance with the contract.

Examine building interior and exterior for compliance with the cited test standards and this Section. Report non-complying conditions in writing. Do not proceed with testing until noncomplying conditions have been corrected.

## 3.2 PREPARATION

Prepare building envelope in accordance with test standards, instrument manufacturer's instructions, and this section.

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### 3.2.1 Test Documentation

Submit for approval detailed test procedures description indicating the test apparatus, the test methods and procedures, and the analysis methods to be employed for the Building Air Tightness Test and the Thermography Test.

### 3.2.2 Building Airtightness Test

Prepare whole building as a single test zone, under closed test envelope conditions.

### 3.2.3 Thermography Test

Pressurize building interior; open interior doors. Remove items from walls and turn off equipment that would interfere with accurate infrared imaging of exterior enclosure performance.

## 3.3 FIELD QUALITY CONTROL

### 3.3.1 Building Airtightness Test

Perform building airtightness test in accordance with [ASTM E 1827](#), Single Point Method, instrument manufacturer's instructions, and as follows:

- a. Supplement building airtightness test with requirements of [ASTM E 779](#) as applicable.
- b. Perform positive pressure test relative to outdoors at multiple pressures up to minimum [0.30 inch w.g.](#) (inches water gauge). Measure building leakage rate.
- c. Perform negative pressure test at multiple pressures up to minimum [0.30 inch w.g.](#) and compare results to positive test. Where difference of 10 percent or more exists between tests, investigate causes and resolve reasons for differences. Retest building.
- d. For each test, take a minimum of five readings at various pressures and air flows within the range of the calibrated equipment. In the test report, show test points in graphical form on a log-log scale with pressure in inches water column displayed on the horizontal axis and flow in cfm displayed on the vertical axis. Submit written report for each complying and non-complying test.

Report results of testing in accordance with cited test standards.

### 3.3.2 Thermography Test

Perform thermography testing in accordance with [ASTM C 1060](#), instrument manufacturer's instructions, and the following:

- a. Supplement thermography testing of wall conditions with requirements of [ISO 6781](#), as applicable.
- b. Supplement thermography test of roof conditions with requirements of [ASTM C 1153](#), as applicable.
- c. Perform thermographic testing in coordination with building

airtightness testing.

d. Report results of testing in accordance with cited test standards. Present thermograms (images) and key drawings of building surfaces. Indicate missing insulation, defective insulation, and other anomalies. Provide written interpretation of thermal images. Include estimate of total area of each construction type and of total area with missing insulation and with defective insulation.

### 3.3.3 Coordinated Analysis and Reporting

Using building airtightness testing in coordination with thermographic testing, identify thermal envelope and air barrier deficiencies and correct construction to bring the work into compliance with this contract.

### 3.4 ADJUSTING

If building fails to meet airtightness performance requirement stipulated in this section, use techniques described in [ASTM E 1186](#) to locate air leak sources. Utilize non-toxic fog agents to identify leaks.

Perform remedial thermal insulation and air barrier work to correct deficiencies in building construction and to bring the work into compliance with this contract.

Perform re-testing to verify building meets this contract.

### 3.5 DELIVERY, STORAGE, AND HANDLING

#### 3.5.1 Delivery

Deliver materials to project site in original packages with seals unbroken, labeled with manufacturer's name, product, date of manufacture, and directions for storage.

#### 3.5.2 Storage

Store materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by air and vapor barrier membrane manufacturer. Protect stored materials from direct sunlight.

#### 3.5.3 Handling

Handle materials in accordance with manufacturer's recommendations.

-- End of Section --

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## SECTION 28 16 00.00 20

## \*4 BASIC INTRUSION DETECTION SYSTEMS (IDS)

04/06

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

## ASTM INTERNATIONAL (ASTM)

ASTM A 123/A 123M (2009) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

ASTM B 32 (2008) Standard Specification for Solder Metal

## INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 100 (2000; Archived) The Authoritative Dictionary of IEEE Standards Terms

## NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2008; AMD 1 2008) National Electrical Code

## UNDERWRITERS LABORATORIES (UL)

UL 1076 (1995; R 1996 thru 2005) Standard for Proprietary Burglar Alarm Units and Systems

UL 1610 (1998; R 2001 thru 2010) Standard for Central-Station Burglar-Alarm Units

UL 609 (1996; R 2005 thru 2010) Standard for Local Burglar Alarm Units and Systems

UL 639 (2007; R 2010) Standard for Intrusion Detection Units

UL 681 (1999; R 2001) Standard for Installation and Classification of Burglar and Holdup Alarm Systems

## 1.2 STANDARD PRODUCTS

Material and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of such products. Items of equipment shall essentially duplicate equipment that have been in satisfactory use at least 2 years prior to bid opening. Equipment shall be supported by a service organization that is, in the opinion of the Contracting Officer, reasonably convenient to the site.

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### 1.3 DEFINITIONS

Unless otherwise specified or indicated, electrical and electronics terms used in these specifications, and on the drawings, shall be as defined in [IEEE 100](#).

- a. Active mode: That in which some type of signal is continuously sent across the link, resulting in simple link breaks being readily detected.
- b. Element: Constituent part of a complex signal such as AC or DC voltage or current, AC phase, or frequency duration.
- c. Fail-safe: Capability to monitor for system functions and to report an alarm when a failure is detected in a critical system function.
- d. Installer: Either the Contractor or a subcontractor with whom the Contractor has a firm contractual agreement.
- e. Intruder: Animate object at least [48 inches](#) in height, [75 pounds](#) in weight and [4 cubic feet](#) in volume, moving through protected zones or portals at a velocity of [0.1 to 10 feet per second](#).
- f. Sensor zone: Geographic position for which an intrusion must be identified and displayed and may be the combination of multiple detection devices.

### 1.4 SYSTEM DESCRIPTION

Provide new infrastructure provisions for basic intrusion detection system (IDS). Provision of IDS shall include running system wires and cables, and system component installation. Each system shall be complete and ready for operation. Equipment, materials, installation, workmanship, inspection, and testing shall be as specified herein. Include materials not furnished by the manufacturer with IDS equipment as specified in Section [26 20 00](#) INTERIOR DISTRIBUTION SYSTEM.

### 1.5 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section [01 33 00](#) SUBMITTAL PROCEDURES:

Include wiring diagrams and details indicating proposed location, layout and arrangement of control panels, accessories, piping, ductwork, and other items that must be shown to ensure a coordinated installation. Wiring diagrams shall identify circuit terminals and indicate the internal wiring for each item of equipment and the interconnection between each item of equipment. Drawings shall indicate adequate clearance for operation, maintenance, and replacement of operating equipment devices. Submittals shall include applicable federal, military, industry, and technical society publication references.

[SD-02 Shop Drawings](#)

[IDS components](#)

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Overall system schematic

SD-03 Product Data

Communication cables

SD-06 Test Reports

IDS operational test plan; G

SD-07 Certificates

IDS operational test plan; G

Installer's qualifications; G

As-Built drawings for IDS; G

## 1.6 QUALITY ASSURANCE

### 1.6.1 Drawings

#### 1.6.1.1 IDS Components

Provide drawings that clearly and completely indicate the function of each component of the IDS. Indicate termination points of devices and indicate interconnections required for operation of the system. Indicate interconnection between modules and devices. In addition, provide a layout drawing which shows spacing of components, location, and details of mounting and positioning.

#### 1.6.1.2 Overall System Schematic

The overall system schematic shall indicate the sequence of operation, the relationship of integrated components on one diagram, and show power source, system controls, impedance matches, plus number, size, identification, and maximum lengths of interconnecting wires. Drawings shall not be less than 11 by 17 inches inches.

### 1.6.2 Experience and Qualifications

#### 1.6.2.1 Installer's Qualifications

Prior to installation, submit data for approval of the installer's experience and certified qualifications. Show that the installer who will perform the work has a minimum of 3 years' experience successfully installing IDS of the same type and design as specified herein. Include names, locations, and points of contact of at least five installations of

the same type and design as specified herein where the installer has installed such systems. Indicate the type of each system and certify that each system has performed satisfactorily in the manner intended for a period of not less than 1 year(s).

#### 1.6.2.2 Instructor's Qualifications

Prior to installation, submit data of the instructor's experience and certified qualifications. Show that the instructor, who will train operating and maintenance personnel, has received a minimum of 24 hours of IDS training from a technical organization such as the National Burglar and Fire Alarm Association, and has 2 years' experience installing IDS of the type specified.

#### 1.6.3 IDS Operational Test Plan

Submit for approval at least 30 days prior to commencement of formal operational testing. Include detailed procedures for operational testing of each IDS component and subsystem, and for performance of an integrated system test.

#### 1.6.4 IDS Equipment

Submit manufacturer's certification of UL listing.

#### 1.6.5 Regulatory Requirements

In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the Contracting Officer. Equipment, materials, installation, and workmanship shall be in accordance with the mandatory and advisory provisions of NFPA 70 unless more stringent requirements are specified or indicated.

##### 1.6.5.1 Reference Standard Compliance

Where equipment or materials are specified to conform to industry and technical society reference standards of the organizations such as American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), National Electrical Manufacturers Association (NEMA), Underwriters Laboratories (UL), and Association of Edison Illuminating Companies (AEIC), submit proof of such compliance. The label or listing by the specified organization will be acceptable evidence of compliance

##### 1.6.5.2 Independent Testing Organization Certificate

In lieu of the label or listing, submit a certificate from an independent testing organization, competent to perform testing, and approved by the Contracting Officer. The certificate shall state that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard. Provide only UL listed ESS equipment for Both exterior and interior ESS sensors, access control, and closed-circuit television (CCTV) components.

#### 1.6.6 Standard Products

Provide materials and equipment that are products of manufacturers



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regularly engaged in the production of such products which are of equal material, design and workmanship. Products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in this section

#### 1.6.6.1 Alternative Qualifications

Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished

#### 1.6.6.2 Material and Equipment Manufacturing Date

Products manufactured more than 3 years prior to date of delivery to site shall not be used, unless specified otherwise.

#### 1.7 WARRANTY

The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract

### PART 2 PRODUCTS

#### 2.1 INTEGRATED SYSTEM FUNCTIONAL REQUIREMENTS

Ensure that the IDS is fully integrated with the physical security and other elements of the overall facility security system. Except for multiple function keypads, other subsystems may be housed in a single enclosure. Specific subsystem functional requirements are as follows:

- a. Detection subsystem: Subsystem shall consist of provisions for sensors to detect intrusion attempts and provide means to indicate a duress condition.
- b. Arm/disarm multiple function keypad: Subsystem shall consist of provisions for electronic digital keypads to monitor and control personnel movement through normal access routes in and out of the facility and between protected areas within the facility.
- c. Communications subsystem: Subsystem shall consist of provisions for elements required to ensure that pertinent data is transferred from the point of origin to the point where appropriate actions can be taken.
- e. Alarm reporting subsystem: Subsystem shall consist of provisions forelectronic devices to control, process, integrate, and annunciate IDS data .

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- f. Power subsystem: Subsystem shall consist of components required to ensure continuous operation of the entire IDS.

## 2.2 INTEGRATED SYSTEM PERFORMANCE REQUIREMENTS

The installed and operating IDS shall be integrated into the overall facility to detect intrusion and shall perform as an entity, as specified below.

### 2.2.1 Detection Coverage

Provide infrastructure, install and adjust government provided sensors so that coverage is overlapping and maximized without mutual interference. IDS coverage shall include critical spaces within and adjacent to the facility.

### 2.2.2 Electrical Power

Electrical power shall be obtained by the normal commercial or base electrical distribution system. Power shall be continuously monitored and, if interrupted, automatic switching from primary to emergency backup sources shall be accomplished without interruption or degradation of critical system function. Intrusion alarms shall not be generated by power switching; however, an indication of power switching and on-line source shall be provided at the alarm monitor. Upon restoration of prime power, the system shall automatically switch back to the primary source. Low voltage condition of an on-line battery and battery charger circuit failure shall be detected and reported as a fault condition.

#### 2.2.2.1 Primary Power

Provide a circuit dedicated to power IDS from a panelboard at the location indicated. Label the circuit breaker in that panelboard: "Alarm System Do Not Turn Off."

## PART 3 EXECUTION

### 3.1 EQUIPMENT INSTALLATION

UL 609, UL 639, UL 681 UL 1076 and UL 1610, and the appropriate installation manual for each equipment type. Components within the system shall be configured with appropriate "service points" to pinpoint system trouble in less than 20 minutes.

#### 3.1.1 Cable/Wire Runs

NFPA 70; Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM, and as specified herein.

#### 3.1.2 Soldering

ASTM B 32. For soldering electrical connections, use composition Sn60, for general purposes; use composition Sn62 or Sn63, for special purposes. Flux shall conform to ASTM B 32.

#### 3.1.3 Galvanizing

Ferrous metal shall be hot-dip galvanized in accordance with ASTM A 123/A 123M. Screws, bolts, nuts, and other fastenings and supports

shall be corrosion resistant.

#### 3.1.4 Tamper Switches

Tamper switches shall be an integral part of all intrusion sensor devices. An initiation of an alarm signal will occur when the door or cover is moved as little as 1/4 inch from the normally closed position. Tamper switches shall also be located within enclosures, cabinets, housings, boxes, raceways, and fittings to prevent direct line of sight to any internal components and to prevent tampering with switch or circuitry. Conceal tamper switch mounting hardware so that the location of the switch within the enclosure cannot be determined from the exterior.

#### 3.1.5 Fungus Treatment

Completely treat system components for fungus resistance. Treating materials containing mercury-bearing fungicide shall not be used. Treating materials shall not increase the flammability of the material or surface being treated nor cause skin irritation or other personnel injury during fabrication, transportation, operation, or maintenance of the equipment, or during use of the finished items when used for the purpose intended.

#### 3.1.6 Conduit

Install in accordance with NFPA 70 and Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM.

#### 3.1.7 Underground Cable Installation

Underground conductors connecting protected structures and objects to the central alarm updating and display unit shall be run in conduit as specified in Section 33 70 02.00 10 ELECTRICAL DISTRIBUTION, UNDERGROUND. Coaxial cable shall not be spliced. If permitted, cables connecting protected structures and objects to the security control console shall be sized such that initially only approximately 60 percent of the circuit pairs will be used. Cable pairs not used shall be reserved for future use of additional detection circuits.

### 3.2 FIELD QUALITY CONTROL

#### 3.2.1 IDS Operational Test Plan

Test shall ensure that the requisite degree of intrusion detection is provided. Initially, test each sensor and subsystem component individually. When the function of each component within a particular subsystem, such as each sensor within a particular zone, is verified, certify that subsystem of the entire IDS has satisfactorily met the specifications. Test each subsystem similarly until each detection zone has been certified. When subsystem certification is complete, test the entire integrated system to ensure that subsystem elements are compatible and function as a complete system. The integrated system test shall be accomplished in linear fashion, end-to-end, and shall verify that each simulated intrusion performed within each detection zone produces an appropriate alarm or signal, and that alarm is correctly annunciated at the keypad. Provide for approval, not later than 30 days prior to formal inspection and test, a detailed operational test plan of how each component, subsystem, and entire IDS will be tested. When tests are complete and corrections made, submit a signed and dated certificate with a request for formal inspection and tests.

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## 3.2.2 System Acceptance Test

## 3.2.2.1 Posted Operating Instructions

System Acceptance testing shall be performed as follows;

- a. The Contracting Officer's Representative (COR) will conduct final acceptance testing of the system.
- b. Prior to the final acceptance test, security contractor shall conduct a complete test of the entire IDS system and provide the COR with a written report.
- .
- e. Prior to the final acceptance test, complete all clean-up and patch work requirements. Security equipment closets and similar areas shall be free of accumulation of waste materials or rubbish caused by operations under the Contract At completion of the Work, remove all waste materials, rubbish, contractor tools, construction equipment, machinery and all surplus materials.
- f. Upon written notification from the Contractor that the IDS is completely installed, integrated and operational, and the burn-in testing completed, the COR will conduct a final acceptance test of the entire system at a mutually acceptable time.
- g. During the final acceptance test, no adjustments, repairs or modifications to the system shall be conducted without the permission of the COR.
- i
- j. The installation of all field devices will be inspected. This field inspection will weigh heavily on the general neatness and quality of installation, complete functionality of each device, and compliance with mounting, back box and conduit requirements.
- k. All equipment shall be on and fully operational during any and all testing procedures. Provide personnel, equipment, and supplies necessary to perform all site testing. Provide a minimum of two Contractor employees familiar with the IDS for the final acceptance test. One contractor employee shall be responsible for monitoring and verifying alarms while the other will be required to demonstrate the function of each device. Supply at least two radios or portable telephones for use during the test.
- l. The COR retain the right to suspend, terminate or reschedule testing at any time when the IDS is found to be incomplete or fails to perform as specified. In the event that it becomes necessary to suspend, terminate or reschedule the test, all of the COR fees and expenses related to the test shall be deducted from the Contractor's retainage. In the event it becomes necessary to suspend, terminate or reschedule the test, the Contractor shall

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work diligently to complete and/or repair all outstanding items as required by the Contract Documents. The Contractor shall supply the NCOR with a detailed punch list completion schedule outlining task-by-task completion dates and a tentative date for a subsequent retest. During the final acceptance test, no adjustments, repairs or modifications to the system shall be conducted without the permission of COR.

## 3.3 ADJUSTMENT/ALIGNMENT/SYNCHRONIZATION/CLEANING

Subsequent to installation, clean each system component of dust, dirt, grease, or oil incurred during installation or accrued subsequent to installation from other project activities. Prepare for system activation by following manufacturer's recommended procedures for adjustment, alignment, or synchronization. Prepare each component in accordance with appropriate provisions of the component's installation, operations, and maintenance manuals.

## 3.4 FIELD APPLIED PAINTING

Paint electrical equipment as required to match finish of adjacent surfaces or to meet the indicated or specified safety criteria. Painting shall be as specified in Section 09 90 00 PAINTS AND COATINGS

## 3.5 NAMEPLATE MOUNTING

Provide number, location, and letter designation of nameplates as indicated. Fasten nameplates to the device with a minimum of two sheet-metal screws or two rivets.

-- End of Section --